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National Security & Innovation Activities: Methodology, Policy and Practice

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N 27 **National Security & Innovation Activities: Methodology, Policy and Practice**: monograph / edited by Dr. of Economics, Prof. O. Prokopenko, Ph.D in Economics V. Omelyanenko, Ph.D in Technical Sciences, Assoc. Prof. Yu. Ossik. – Ruda Śląska : Drukarnia i Studio Graficzne Omnidium, 2018. – 416 p.

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Monograph is devoted to the research of theoretical and practical aspects of the innovation security. Different innovative methodic approaches and economic mechanisms to provide innovation security at the regional, national and international levels are considered. Scientifically grounded recommendations to achieve economic, financial, social and ecological aims of the national security through the strengthening of innovation system are given.

Keywords: national security, innovation activities, innovation security, international economic relations, innovation policy, technology transfer, investment, policy, management, marketing, ecological security, economic mechanisms, “green” economy.

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4.6 IMPLEMENTATION OF REGIONAL INNOVATION POLICY THROUGH CLUSTER MODEL

World globalization processes cause the formation of a globe information, finance, trade, infrastructure space together with a complication of relationship and interdependence between nations. Globalization objectively leads to the depreciation of usual regulatory functions of a national state, which doesn't protect the domestic economy from adverse external influences as it used to. National and global economic relations are changing roles in a globalized world. In the past, the leading role belonged to the first. In the last decade, the world economy is gradually turning into a single hunting field for big business, where the geography of the location of productive forces, the sectoral structure of investment, production and distribution are determined by taking into account the global situation. National economies are experiencing the increasing pressure from uncontrollable and unpredictable global factors.

The processes of globalization are contradictory. On the one hand, globalization creates incentives for economic growth for majority of countries. At the same time, globalization is accompanied by negative consequences, among them are the following:

1) *Increasing of social and economic inequalities* between countries and nations due to the collapse of major structures – the colonial empires and multinational states – that caused a global asymmetry, when the major actors (states, multinational corporations, associations, integrations of developed countries) are opposed to poor developing countries. Globalization has transformed from the objective process to the project of domination of the group of countries in the world economy. As a result, the "chronic diseases" of society – terrorism, separatism and extremism – are exacerbated;

2) *The deterioration of social security:* globalization has led to a redistribution of resources between private and public sectors. Markets succeed in capital making, but they don't implement social programmes;

3) *Strengthening the interdependence of countries* on a global level that leads to a potential global instability, to susceptibility of the financial markets to the crisis;

4) *The destruction of the environment* as a side effect of reckless pursuit of profit;

5) *Destruction of national identity:* Globalization provides market-driven, 'branded' homogenization of the political, economic, social, cultural spheres of people's life, destroys stable localities, displaces people, obliterates the differences between locality-defined lifestyle.

Global economy crisis 2007-09 demonstrated an intensification of contradictions of globalization. A society in which the global economy is subject to the idea of profit maximization

for limited number of global actors is doomed. Modern society is moving towards a new "post-global" phase of development, whose motto is "think globally, but act locally". Effective use of regional specificity, which is determined by unique climatic, historical, cultural, social and economic features of a region, becomes a crucial minimizing factor of the negative consequences of integration into the global economy. The phenomenon of global and local combination in modern literature is called "glocalization" [11]. It turns national regions into global actors and key determiners of national competitiveness.

Crisis processes in the global economy caused an increased interest to the clusters as to the sustainable economic modules with prompt and effective reaction on changes in local and global economies. Thus, economists who analyzed the impact of the Asian crisis 1997-99 on the Asia-Pacific region [21] concluded that in countries, where was the highest level of clustering of regional economy, the impact of the crisis was minimal or almost intangible. At the same time, the economies of several Asian countries did not survive under the onslaught of this deadly crisis because of their microeconomic weakness, lack of domestic competition, ineffective governance and weak banking system.

The concept of a cluster is not a phenomenon for the world economic science. Analysis of theories, which are assumed as a basis of cluster approach to the regional development, has found an evolution of key factors of their formation from traditional factors, based on historical devevelopment of a certain region (favorable geographical location, labor, infrastructure, developed market), to innovation factors. Innovation as a production function was introduced by J. Schumpeter (1911), and later theories emphasize the crucial role of innovation in the process of cluster formation. More recent theories, including the Ph. Cooke's (2002) theory, emphasizes the role of social capital in the formation of a cluster, the growth of trust between members of a cluster, that, to the point, A. Marshal (1890) mentioned in his studies. G.-J. Hospers (2004), the representative of the Neo-Schumpeterian theoretical school, draws attention to the limitations of the approach that provides a support only for high-tech clusters, and indicates the necessity of harmonious combination of traditional advantages of a region and innovation. Evolution of theories of a cluster approach to the regional development reveals the dilemma: does a region provide the competitive advantages for a cluster, or vice versa? This collision in the formation of economic activity centers has been discovered by the P. Krugman (1991). A region as a factor of competitiveness is supported in theories of I. Tyunen (1826), A. Marshall (1890), A. Weber (1909). According to these theories firms are concentrated in a region, which has necessary factors for firm's development. At the same time, a cluster as a factor of increase of region's competitiveness is developed in theories of J.Schumpeter (1911), F. Perroux (1950), G. Bekattini

(1980s), M. Porter (1990), Ph. Cooke (2002. According to these theories, a cluster as a “growth pole” is set up in the economically underdeveloped region with the aim to intensify the economic activity in this region. That is where a tendency of disurbanization, which is revealed by P. Krugman (1991), comes in: while the majority of enterprises concentrate in a certain region, which is favourable for their development, an enterprise that isn’t included into the cluster has an opportunity to become a monopolist in a less attractive region and become a “growth pole” for this region. Gradually, accompanying enterprises and companies will concentrate around this enterprise, and this concentration of enterprises will transform into a cluster, which will provide a development of this unattractive region [7].

The analysis of theories of cluster development reveals that the increase of a cluster’s competitiveness and the increase of a region’s competitiveness are conditional on each other. On the one hand, every region is unique and has its own set of competitive advantages, which is used by a cluster for its development. On the other hand, a cluster provides additional competitive advantages for a region.

Etymology of the word "cluster" is derived from the English language, which means accumulation, concentration, set, group, etc. [16]. The concept of a cluster is used in various fields of knowledge, and although the interpretation of this concept is different, the sence remains the same: cluster – is a union of several homogeneous elements that can be considered as a separate unit with its specific characteristics. In the economic field, cluster – territorial and sectoral voluntary association of companies that work closely with academic institutions and local authorities to increase the competitiveness of its products and economic growth in the region [18].

Required features of clusters of all types, are the following: 1) symbiosis of business, science, education; 2) support of local authorities and central government; 3) presence of common goals and ideology; 4) presence of a cluster brand; 5) development of innovation and effective communication.

The enterprises-participants of a cluster receive such advantages as: productivity increase, adoption of innovations, promotion of entrepreneurial initiative, development of effective communication, diffusion of knowledge and information. At the same time, every of these advantages stipulates benefits for the region. Productivity increase in the companies provides an effictive usage of resources, GRP growth, employment increase in the region.

The adoption of innovations, diffusion of knowledge and information within cluster participants cause an innovation development of the region, realization of its innovative and scientific potential, and, importantly, enhance the practical relevance of research and

education. Researches of scientific and educational institutions in the cluster are practically applicated on the enterprises that is possible due to joint funding of research within the cluster. The development of the cluster enterprises on the innovative basis increases the share of high-tech products in the export of the region and the country as a whole, and opens new world markets for them.

Increased entrepreneurial initiative stipulates the creation of new work places, promotes foreign investment, tax base, development of infrastructure in the region. The traditional industrial policy, which provides subsidies for uncompetitive industries, attracts unproductive investments, is changed.

Development of effective communications within the cluster becomes possible due to informal contacts and trustful relationships between people who live and work in the same area and share general purposes of the cluster.

One of the major advantages of cluster development for the region is the balance between market efficiency and social harmony that leads to improvement of life quality in the region. For example, the adoption of innovations on the cluster enterprises causes the environmental safety of their activities. Innovative basis of cluster development requires an increased attention to the development of social capital. This confirms that the cluster approach to regional development meet goals and objectives of sustainable development.

The mechanism of cluster impact on the region's competitiveness can be represented by the law of physics about the mechanism of rays passing through the collecting lens: all rays that pass through the collecting lens are refracted and collected at one point. It is known, the sun rays, which pass through the collecting lens, are concentrated at one point that is able to light a subject on which this point is directed.

The mechanism of cluster influence on the region's competitiveness is similar. It should be noted, that models in Fig. 4.7 has some simplification, namely, they consider only enterprises with foreign economic activity; the model of the region's presence on the world market is represented only by one cluster, but in practice there are more than one cluster in a region. Competitive advantages of a region are determined according to Fathutdinov's works [22].

Fig. 4.7 illustrates two models of the region's presence on the world market. In the model of the region's presence on the world market without a cluster (Fig. 4.7.a): each company enters the world market independently that disperses the region's competitive advantages, which are used by companies, and, as the result, the region is represented on the world market not with its full capacity. As the world practice demonstrates, independent and isolated use of regional

competitive advantages by a separate enterprise for taking its place on commodities and capitals markets is impossible. Therefore market participants tend to co-operate with each other and to collaborate with the state, science and public. Such associations – clusters – allow to obtain a high level competitiveness on the basis of joint introduction of innovations, the increase of labour productivity and synergy effect.

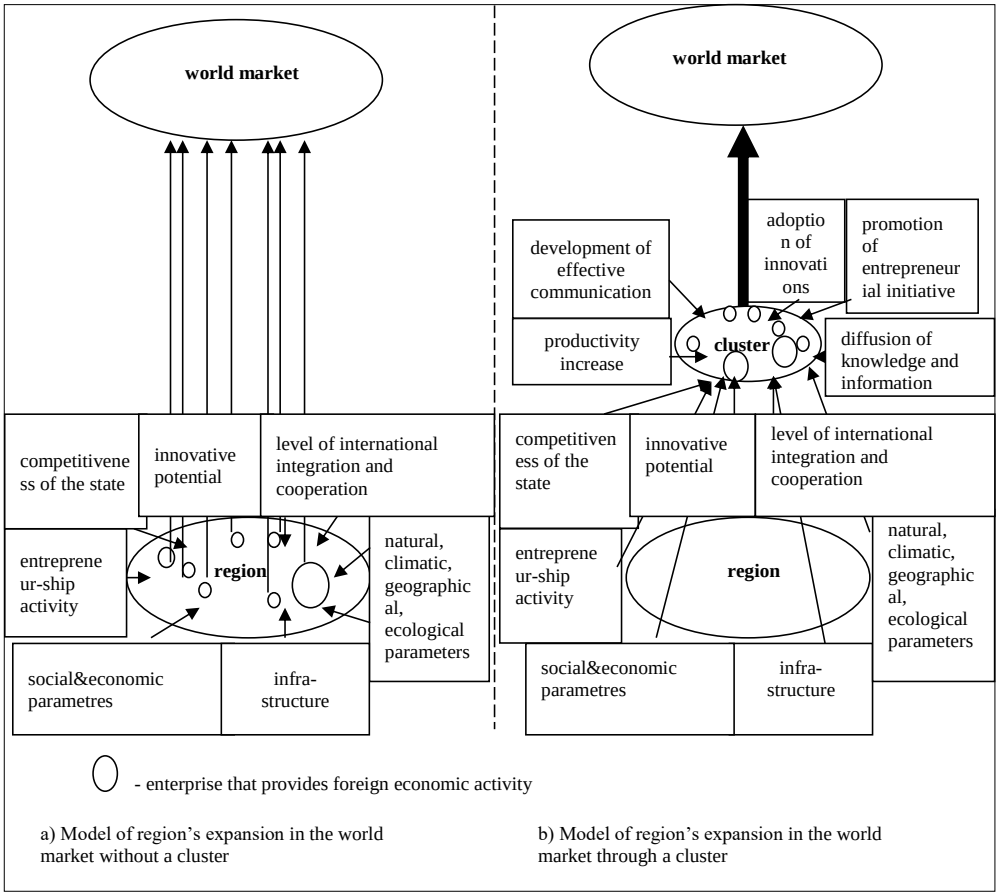

Figure 4.7. Models of the region's presence in the world market [developed by the author]

When the cluster functions in the region (Fig. 4.7.b), the enterprises of the cluster use not only region's competitive advantages, but also those advantages that are created within the cluster. The region is represented on the world market through the cluster, which as a lens focuses region's and cluster's competitive advantages, and becomes a powerful tool for the increase of the regional economic impact on the global market.

Clusters' functioning in a region needs an estimation of their influence on the economical development of a region. The majority of the existent scientific and methodical approaches of the analysis of cluster's effectiveness are oriented on the estimation of the dynamic of cluster's development in a region. At the same time, it is important for the complex estimation of the cluster's functioning in a region to determine interconnections between the economic results of cluster functioning and factors that stipulate results.

According to the regional export specialization theory [1], regional growth rate depends on export dynamic directly. Due to this theory the external demand on regional export products is a function of price on export goods, profit rate and price on goods-substitutes on the world markets, and also of products quality and after-sale service. Moreover, factors that determine the level of production costs, among them are salary, raw materials, amortization costs, technology development, operational costs, also influence on the region's place on world markets. If these factors influence on regional export growth, the levels of the Gross Regional Product and, consequently, well-being of local people increase gradually.

The cyclical theory of cumulative competitiveness of a region [9] also determines a key role of export in the region's competitiveness. Due to this theory the cycle of the region's competitiveness growth is the following: growth of Gross Regional Product (GRP) – promotion of innovation activities – increase of labour productivity level – decrease of relative salary costs – decrease of production cost on export goods – increase of the demand on export goods.

These theories are proved by the empirical research of competitiveness factors of the NUTS-2 level regions of the EU countries, which was conducted by the European Commission Directorate-General Regional Policy [24].

The additional economical effects that strengthen competitive advantages of a region are developed within a cluster. Enterprises-participants of the cluster receive an additional synergetic effect due to joint resource exploitation (the strategy of technologies and costs), market infrastructure (joint merchandising) and fields of activities (synergy of planning and management). The sense of the synergy strategy is a possibility to receive higher production profitability due to interrelations between enterprises within the cluster than in the situation when they function separately. An additional social and economical effects are received due to the cluster-type placement of production and service enterprises according to their transport and geographic allocation; sustainability of cross-sectoral linkages, that is especially important in terms of unsteadiness on world markets; reduction of transport costs; complex usage of all resources.

There are following economical effects that enterprises receive due to their participation in the cluster:

1) effect of joint adaptation of innovations: technological exchange increases significantly the cluster's competitiveness, because new ideas, business processes, technologies become accessible for all enterprises within the cluster;

2) effect of outsourcing: an enterprise deliver supporting business processes and production functions to a specialized company that helps to concentrate organizational, financial, human resources in top-priority fields;

3) effect of risk costs distribution between the cluster participants: enterprises provide joint risk management to decrease a size of possible losses;

4) effect of joint usage of the infrastructure: deepening of a production technologic specialization and cooperation, setting up of service and support enterprises and infrastructural objects;

5) effect of transaction costs decrease due to joint usage of knowledge and information data base within the cluster;

6) effect of forming of a joint goods-distributing base on each kind of cargo flow: this base helps to decrease costs on immobilization of circulating assets when they are in a process of delivery.

The methodic approach to estimation of economical effects that receive enterprises due to their participation in the cluster is based on the following methods: method of determination of social and economical effect of forming of maritime complex [17]; innovation activity [23]; usage of joint goods-distributing base [20].

Influence of a cluster on the region's competitiveness we have proved on the basis of the cyclical theory of cumulative competitiveness of a region. As it can be seen on Fig. 4.8, the additional economic effects within the cluster strengthen the increase factors of the region's competitiveness.

The effect of joint adaptation of innovations within the cluster influences on promotion of innovation activities in the region that in its turn causes an increase of labour productivity level in the region. The effect of outsourcing within the cluster helps to decrease salary costs in supporting production processes and functions of enterprises. The effects of risk costs distribution between the cluster participants, joint usage of the infrastructure, transaction costs decrease influence on the production cost. An effective satisfaction of demand on the region's export is provided by the forming of a joint goods-distributing base on each kind of cargo flow within the cluster that speeds up cargo deliveries.

Thus, the proposed methodic approach of complex estimation of the cluster's functioning effectiveness in a region gives an opportunity to investigate the sources of synergetic effect of the cluster for enterprises-participants and for the region where this

cluster functions. This methodic approach is universal, takes into account the additional synergetic effect, is easy to use, decreases the time for the analysis that is especially important in conditions of changeable external environment.

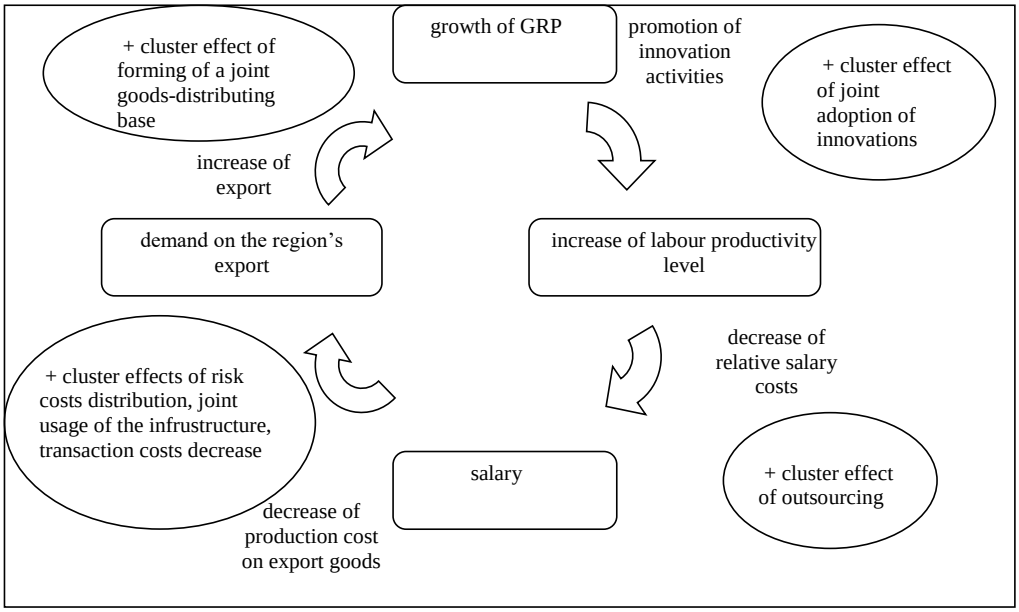

Figure 4.8. The influence of cluster effects on the factors of the region's competitiveness increase [worked out by the author]

Concluding remarks

Due to the effective influence of a cluster model on the competitiveness of enterprises-participants, regions and states, it should be supported and stimulated by the governments. There are two generations of cluster policy [4]. Cluster policy of the first generation includes measures of identification of clusters, general cluster policy support, which are undertaken by state and regional authorities. It provides generally accepted "rules" for the clustering process. Cluster policy of the second generation is based on knowledge of existing clusters in the country and provides an individual approach to the development of each cluster. State may stimulate the development of clusters, conducting various measures: 1) "broker" policy – a platform for dialogue between different actors of a cluster, 2) diversification of a local demand through placement of government contracts in local companies, 3) training the local workforce through the implementation of special educational programmes and 4) creation of a "brand" of a region to attract foreign investment.

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