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Article

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Cluster Initiative in Fine Chemicals as a Case of Practical Implementation of Triple Helix Collaboration for Regional Economic Growth and Innovation-Driven Development

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Abstract. *The authors apply the cluster theory and the Triple Helix model to analyze the situation and challenges of economic and innovation-driven development of Russian regions starting from 2008 using the example of Tomsk region. Referring to the works of the leading researchers, the authors place special emphasis on the theoretical relevant background for the situation of the practical decision-making regarding the development of the regional cluster policy. The ground for singling out in the concept of innovation and industrial clusters makes it possible to raise a question of the search for proper measures to support innovation clusters by the regional government. In addition, it allows noticing the change of roles of universities and research institutes. Having reviewed the most prominent examples of petrochemical cluster creation in the world and analyzed a cluster initiative in the fine chemical industry in Tomsk region, the authors make several suggestions regarding the sustainability of cluster initiatives. An analysis of this phenomenon within the frame of Triple Helix enables discovering new areas of work with cluster initiatives for researchers and experts. Besides, the authors show that a cluster initiative based on the SME's leading role hastens the changes in regional economic and investment policy and research agenda of universities. On top of that, the article analyzes a number of phenomena within the context of the Triple Helix, including the appearance of keystone people. They are able to «glue together» disparate elements of the ecosystem and become a base for Triple Helix based initiatives.*

Keywords: *cluster initiative, industrial cluster, innovative cluster, fine chemical industry, SME, Triple Helix.*

Introduction

The last 25 years have been marked by the rapid proliferation of cluster-based approach to a wide range of economy sectors. The governments of many countries strive to encourage the geographical concentration of companies to achieve high-density entrepreneurial activity in the territory and attain prosperity. Special focus in the national and regional agendas is given to cluster-based initiatives in dedicated sectors. One of them is a petrochemical industry.

It would seem that the global petrochemical market, based on a series of the largest clusters, has already completely settled. The territories that had managed to timely concentrate industries and win in this global competition have been defined. Still, the development of fine chemical industry in the last 20 years gives a chance to new players and territories that might not possess a range of factors that used to be mandatory for large-scale petrochemical industries.

One of such territories is the Tomsk Region. The region was the first in Russia to host an innovations forum (in 1998), adopt Russia's first regional law on innovation activity (in 1999) and the regional strategy for innovative development (in 2002). Today this region with its high concentration of scientists, innovative companies, and large petrochemical industries strives to develop fine chemical industry and make its cluster a globally noticeable player, comparing itself with the best chemical clusters in the world.

Theoretical relevant background

The authors find it very important to consider to theoretical aspects of cluster theory that allows shedding light on new focus areas to stimulate economic growth and innovation development of a region.

One of the first ones to state the direct interrelation between innovations, clusters and national competitiveness is Michael Porter. In his early works, he describes a cluster as a geographically proximate group of interconnected firms and associated institutions in a particular field, linked by commonalities and complementarities (Porter, 1998).

Starting from the years the 2000s, the clusters entrenched themselves in the economic growth agenda of different parts of the world, which are looking for economic growth stimulation, industrial and innovation-driven growth. Clusters develop in different historical and economic environment. However, they share one goal – to eliminate all the barriers to convert knowledge and to get organizations and people interacting. Also, to increase region marketability, make their territories more globally visible – bring in investments, talents, and new technologies.

In 2001 the Organization for Economic Cooperation and Development (OECD) published the book *Innovative Clusters: Drivers of National Innovation Systems* which used empirical studies of innovation clusters in developed countries to show that regional innovation systems are the drivers of the national innovation system. And availability and support of industrial clusters present at a territory is an effective tool assisting economic advancement not only in developed countries but in developing economies as well (Xie, Wu, & Ma, 2016).

Today, the clusters are a key player in the development of regional economy and, consequently, new regional industries emerge where there is a strong cluster environment (Delgado, Porter, & Stern, 2014). With that, it's increasingly frequently being proven that the clusters based on interaction of business, academic and scientific organizations and government authorities are more effective (Fundeanu & Badele, 2014). Therefore, one may talk of sustainability and effectiveness of the Triple Helix based cluster initiatives.

Earlier clusters were common for low-tech economy sectors (textile industry, clothing, and leather goods manufacturing), but in a short, while this concept started being applied by high-tech companies evolved in university labs and research centers (Etzkowitz, 2008). The authors Xie et al. (2016) also address numerous studies highlighting the differences between concepts of innovation and industrial clusters. Innovation clusters are characterized by creation of new knowledge, role of research institutions and universities as competence centers, creating demand for products, processes, and services, central and local authorities; establishing necessary policies and infrastructure development; and interconnections between the actors (e.g. suppliers, companies, development institutions, universities, and public authorities) involved (Xie et al., 2016).

According to some researchers who support their viewpoint by empirical data, stimulation and support of clusters are priority objectives for the authorities, including such aspects as entering new markets and forming

favorable conditions for effective business performance. However, the desired effect from the government support is not always obtained. It could happen because of a different understanding of the existing problems and choice of tools for their solution.

Along with that, industrial and innovation clusters require various supportive measures from federal and regional governments. A particular opportunity for the regional government to influence the development of clusters is financial support and development of new institutional environment (Engel & del Palacio, 2009). For instance, the essential condition for successful development of industrial clusters is state participation and support which can be carried out in several focus areas, including management of cluster formation, functioning, and development, cluster development financial support (that can consist of state funding, subsidy programs for business), creation of favorable conditions for cluster development (elaborating regulatory framework, granting tax exemptions, etc.) (Ketels & Memedovic, 2008). Innovation clusters require other supportive measures focused on intellectual property protection, export support, improvement of the business environment for technology companies, strengthening the role of universities.

Researchers pay significant attention to the geographical consolidation of enterprises. One of the works in this sphere *Innovation dynamics and spatial response of heavy chemical industry: rethinking the cluster innovation* (Lin, 2016) introduce the results of analysis of the innovation pattern and the changes of spatial organization forms of chemical industry in Germany based on spatial econometric models. According to the article, "technological characteristics of the heavy chemical industry and the feature of innovative cooperation inevitably result in a weak geographical proximity and an enlarging spatial scale. Because technological hierarchy of clustering firms leads to a fundamental change of innovation externalities, geographical proximity is not a necessary condition for innovation and the spatial scale of innovative cooperation enlarges from a cluster to a region" (Lin, 2016, p.1405). At the same time, "chemical industry requires a location with comprehensive knowledge and general technology diffusion" (L1n, 2016, p.1407). Therefore, changes in the spatial consolidation of chemical enterprises are connected with "enhancing the innovation capability and fostering the innovation collaboration between large industrial zones" (Lin, 2016, p.1407).

Having conducted the study and having this research background, we can address the situation in Tomsk region and look at the development of the

region economy in the context of the implementation of Triple Helix-based industrial and innovation cluster initiatives.

Historical account and evolution of the innovation policy in Tomsk region

Every region strives to mark its place on the economic and industrial map of its country and global economy. The accelerator of this search is critical times in the economy. The global economic recession of 2008 forced many regions to review their policies and look for new economic growth sources. Among them, one may single out regions with strong oil and gas sector that include Tomsk region. On the one hand, financial returns from the oil and gas sector could not cover all the regional budget expenditures. On the other hand, large enterprises of the traditional economic sectors were hit by the recession the most. However, the innovation sector and processing industry of Tomsk region got less hurt by the economic recession due to their diversified product range.

In the post-crisis period, the leading Russian regions put an increased focus on the transparency increase of the regional economy development priorities for investors, large companies, small and medium-sized business. The agenda of regional governments included development stimulation of manufacturing and new economic sectors.

Tomsk has high population quality (44% having a university degree) and developed innovation sector and powerful universities. According to the specialists' research in 2010, it has every reason to become the center of non-energy economic growth. Tomsk region stands out from other regions not only for increased rate of people engaged in small business (17%) but also for the strong concentration of small business in pioneering industries (Zubarevich, 2010).

Over the 2009 to 2011 period, Tomsk region significantly focused on the innovation sector development. By that time, there were about 400 high-tech SMEs in the fields of IT, electronics, chemistry, pharmaceuticals, new substances etc. These companies were established in the years the 1990s and 2000s. A part of them was located in the special economic zone, the creation of which started in 2005, following the federal government decision.

Over the 2009 to 2011 period, particular attention in Tomsk region and the Russian Federation was devoted to the stimulation of universities' ability to

create a space around them filled with innovative companies. On a yearly basis, four Tomsk universities established up to 50 small innovation enterprises. Along with that, by the year 2012, it became clear that this policy did not have a substantial influence on the region economic development.

On the one side, the recession of 2008 showed that the developed for decades (back in the Soviet period, too) region specialization within light crude oil extraction and low-added value processing at high oil process are ineffective and threaten with economy sustainability failure. On the other side, current industry and innovation stimulation moves had a low economic impact. It became clear that the regional policy of industrial and innovation development needed to be reformed.

Transition to the cluster policy was a response to all these challenges. Thus, identification of new opportunities for regional economic growth got the federal government support. In 2012, the Government of the Russian Federation together with the leading regions and companies introduced supportive measures for clusters in regions in order to stimulate economic advancement and create global competence centers for the process industry.

Tomsk region was not an exception in this activity. In 2013, as the new Governor and his team came into Tomsk region, an initiative of innovation policy commitment to the demand of large companies was announced. A strategic workshop with the federal ministries, large companies and universities was held. It resulted in the identification of long-term priority areas for the region economy development. Every area was chosen taking into account plans for the large companies and federal ministries, the readiness of Tomsk business, the capacity of universities and research institutions, regional government ability to render support. All 5 focus areas, i.e. «Advanced industry», «Science and education», «Technological innovations, new business», «Smart and comfortable city» and «Business environment», were brought together into a large-scale project on try-out of a new economic growth model.

On January 14, 2015, the INO Tomsk Project was approved by the Government Executive Order of the Russian Federation. In the Russian language, the acronym «INO» stands for three words: «industry», «science» and «renovation». The stakeholders, operating at the territory, believe that renovation of industry and science is possible to be reached if the

interaction of industry, regional government and universities are more keenly focused on economic growth and innovation-driven development.

The core task of the project is to help to give birth to a bunch of new Triple Helix based initiatives with economic impact. The list of participants of the INO Tomsk Project includes regional and federal authorities, companies, universities, research institutes and development institutes. The Project's implementation is based exclusively on reconfiguration and intensification of the collaborative links between Triple Helix participants.

Innovation and industrial development activities are united in the «Advanced industry» focus area. The «Advanced industry» area plans to work on acceleration of the six Triple Helix based cluster initiatives in chemical industry, nuclear industry, wildlife resources based industries, hard-to-recover hydrocarbons reserves, timber industry, pharmaceuticals, medical devices and IT.

The clusters can be identified from «top» to «bottom». «The «top» approach allows identifying high-profile for the federal authorities and large companies partnering plant facilities. The «bottom» approach enables singling out potential clusters – groups of innovative companies, universities and research institutes operating within new high-growth economy sectors» (Zubarevich, 2010). The INO Tomsk project applies combined approach.

Implementation of the INO Tomsk Project will help to understand how to turn cluster initiatives into fully-fledged industrial and innovation clusters. The authors of the article belong to two institutional areas. They work in the research and educational center of Economic Policy and Innovation Governance at National Research Tomsk State University and are executive officers at the INO Tomsk project office that was created by the regional government. The main task of the project office is to help seed collaborations and Triple Helix based initiatives with economic impact. Together with the regional government, companies, universities and research institutes, the office pays significant attention to development and startup of cluster initiatives. At the XIII Triple Helix International Conference 2015 in Beijing, the authors presented experience of cluster initiative implementation in new sector of economy – Renewable resources based industry (forest and reforestation (non-timber forest products, procurement of wild-growing and non-wood forestry products), non-agricultural food (wild berries, mushrooms, herbs, pine nuts, products of pine gum processing), fish and aquaculture, hunting species). In 2016, there was started work on a new cluster initiative in chemical industry. The

authors of the article try to find new opportunities to develop cluster initiative in chemical industry.

For this purpose, they put several questions about the role of clusters in regional development:

1. Is it possible to create a cluster in fine chemicals in Tomsk region?
2. Who could be the driving force for this process?
3. What are the roles of all Triple Helix actors in the creation of a cluster in fine chemical: government, SME's, large-scale business, universities and research organization?
4. What is the best way for the government to be engaged in cluster formation?
5. What mechanisms of regional cluster policy can be implemented in this case?

The story behind the paper: cluster initiative in fine chemicals in Tomsk region

This article presents fine chemicals cluster initiative in Tomsk region as a case of practical implementation of Triple Helix Collaboration for regional economic growth and innovation development.

According to the INO Tomsk Project, the Strategy of Tomsk Region Development up to 2030, cluster initiative in chemical industry should be implemented on the base of the special economic zone with large companies, universities, research institutes and SMEs being engaged.

The objective of the petrochemical cluster development in Tomsk region was discussed since 2012. In 2014, it gained the support of the Government of the Russian Federation and large petrochemical companies. By that time, Tomsk region already had basic chemicals productions and R&D center of the Russian petrochemical leader, SIBUR Company, located on its territory. In 2014 chemical production made about 17% of the region manufacturing industry (not including pharmaceutical industry), the share of oil product manufacturing – 17%. Chemical plants production occupies 13% within the export structure. At that, chemical production enterprises provide more than 5500 workplaces.

Therewith, in the last three years, the creation of the cluster has been accompanied by two processes. The first process is negotiations with the large companies for the buildup of new productions. In the course of these

negotiations, the regional government relied on new projects of large Russian companies. The leading players have already concentrated polymer production (fourth process stage) in the region and it was proposed to consider investment into the development of not only large-scale production but also into smaller high value added products manufacturing. The second process is negotiations with the federal government for development of the transport infrastructure, which is an essential factor for large-scale productions.

The world economy stagnation made it possible to combine two factors that put a question mark over the current plans for the creation of the petrochemical cluster. Large companies started curtailing their investments in the field of new large-scale and high-tech productions in Tomsk region. The federal government reduced public investment into the transport infrastructure development. By the end of 2015, this situation resulted in the regional government needing to look for an extra driver for petrochemical cluster development and to choose a strategic approach.

In order to restart cluster initiative in the chemical industry, estimate participants' readiness and possible implementation focus areas, it was decided to hold one more strategic session with all the stakeholders. It should be pointed out that starting from 2013 the format of strategic sessions with the participation of the authors became the key element of the Tomsk region strategic planning system. Usually, the stakeholders, that are able to influence the definition of the regional economy development goals, belong to some institutional area and branch. The interest and vision referring to only one institutional area are not enough to see a big picture of regional economic development. Therefore, the format of strategic session engages all Triple Helix actors. The strategic session is a format of collaborative work of all Triple Helix actors aimed at case analysis and joint development of strategically valuable solutions.

The session participants: representatives of petrochemical companies, SME's in fine chemicals, universities, regional administration as well as representatives of the federal government (Ministry of Industry and Trade of the Russian Federation, Ministry of energy of the Russian Federation) and development institutions (Federal Corporation of Small and Medium Enterprises Development established by the Government of the Russian Federation in 2015).

The session participants answered the following questions:
1.What is important for the development of SME`s? What focus areas require collaboration?

2.What strategic steps should be taken to implement Triple Helix based cluster initiatives in fine chemicals? What is the vision of small companies? What do they count on?
3.How should the role of universities and research institutes change?
4.What is required from the regional government? How should the state support be changed? What should be the changes in the regional government policy regarding investment encouragement?
5.What's the position of the federal ministries? In what case will a cluster initiative in the chemical industry be important for them?

During the session, the leaders of small and medium-sized business in the field of fine chemicals, together with universities and scientific institutions put forward a counter-proposal. SMEs suggested placing a bet on the creation of innovation cluster combining high-marginal low-tonnage export-oriented productions that will enable expanded presence at the most profitable segments of Russian and global markets. Indeed, since Tomsk region has universities and research institutes with strong research teams and scientific infrastructure in the field of chemistry, has federal and regional SMEs support program – it created a development opportunity for innovation cluster.

SME's suggested to set up the Association of Fine Chemistry Manufacturers of Tomsk Region, which would act as a «third» player in the petrochemical industry of the region along with two large companies – SIBUR and SibMetaHim. The Association is also supposed to become the agent of SME's interests in the federal ministries and regional government.

After the strategic session and over the period from April to July, there were held four meetings of the Association with the participation of SMEs, National research Tomsk state university, National research Tomsk polytechnic university and regional government officials responsible for economic and industrial policies. During this time, the authors observed adjustment of SMEs, regional government and universities positions towards the cluster initiative in fine chemicals.

Framework for cluster policy in Tomsk region

In 2013, as the new Governor and his team came into Tomsk region, an initiative of innovation policy commitment to the demand of large companies was announced. There was organized a strategic workshop with the federal ministries, large companies and universities. It resulted in the

identification of long-term priority areas for the region economy development. Every area was chosen taking into account plans for the large companies and federal ministries, the readiness of Tomsk business, the capacity of universities and research institutions, regional government ability to render support. All 5 focus areas, i.e. «Advanced industry», «Science and education», «Technological innovations, new business», «Smart and comfortable city» and «Business environment», were brought together into a large-scale project on try-out of a new economic growth model.

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The core task of the project is to help to give birth to a bunch of new Triple Helix based initiatives with economic impact. The list of participants of the INO Tomsk Project includes regional and federal authorities, companies, universities, research institutes and development institutes. The Project's implementation is based exclusively on reconfiguration and intensification of the collaborative links between Triple Helix participants.

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Global chemical clusters: comparative case studies

Specific theoretical relevant background allows using current clusters dividing into industrial and innovation clusters in order to analyze global cases. The main question is – is it possible to create innovation clusters in chemical industry? What factors influence their development? Can such cluster be created on the territory with the lack of resources specific to chemical industry?

At the present stage, petrochemistry is a mature global market based on 10 petrochemical clusters established around the largest productions. To enter the market, new players need to have diversified range of high-added value products within extremely specialized niches and new approaches to work with the market.
Leading petrochemical clusters can be qualified as industrial clusters. «Industrial clusters are groups of related manufacturing companies in a concentrated geographical area, which can benefit from shared infrastructure and utilities. Clusters can be important regional actors, driving employment, research and development of local infrastructure» (Bungener, Hackl, Van Eetvelde, Harvey, & Marechal, 2015). Essential factors for industrial petrochemical clusters are resource access, transportation corridors, and favorable geographic location etc. It is

important for industrial companies situated near sources of raw material (this industry development policy was implemented in the USSR).

Currently, the experts distinguish three largest petrochemical clusters, which are Singapore, Houston (Texas), and Antwerp (Belgium) (Pillai, 2005). If the Singapore experience arouses interest as a precedent of a cluster created «from scratch» with the main sponsor being the state and the key player at the stage of the cluster becoming a global player was business, the other two clusters, Houston and Antwerp, demonstrate a different development model. Antwerp cluster is a part of a huge cargo turnover system and since there are four refineries located at the port territory, the significant share of the system is taken by oil and oil products, so the cluster is basically a hub that connects the interests and resources of those entering the territory and the resources which are already available there (educational organizations, R&D infrastructure). A business unit of Antwerp petrochemical cluster is integrated into the structure of the port of Antwerp and it is a government owned corporation, managing cluster functioning, and development.

Texas petrochemical and the chemical cluster are one of six priority clusters of the state economy development with the purpose of their development being the increase of Texas marketability at national and international scales (Specialty Chemical, 2013).

The given instances of the leading petrochemical clusters are united by large-scale production. Such clusters are primarily industrial clusters. However, clusters can be created in the areas not having stock of some specific raw materials.

Singapore petrochemical cluster (one of the top-3 in the world) formation experience demonstrates development practice of modern petrochemical productions in highly profitable global market niches. Having chosen chemical industry as its priority, Singapore authorities managed to relatively quick (within 15-20 years) build «from the ground up» (not having raw materials, land and favorable geographic location resource access-wise) one of the largest petrochemical clusters in the world with cumulative investments, put by over 100 companies starting from the year 2000, of more than $35 billion (Baranov, 2013). If the idea of the cluster development belonged to the Singapore authorities and at the stage of its creation the state directly invested into the infrastructure construction, then afterward the island got not only field-oriented petrochemical investors coming but service companies as well. The model of Singapore cluster work looks as follows: according to the petrochemical development

plan, the state negotiates with potential investors and then brings them into contact with current residents who are able to provide new companies with raw materials. Moreover, it goes this way throughout the whole chain: from oil refining to specialty chemicals. Now, Singapore chemical industry is the key branch of its economy and constitutes more than 30% of the country's overall industrial production. To gain maximum effect from the chemical cluster development, the government of Singapore invests into the development of science, engineering, education, the attraction of R&D centers and scientific infrastructure (Baranov, 2013).

As stated above, innovation clusters recently gained significant attention from economists, analysts, representatives of business and public authorities. The governing factor for innovation clusters is not access to raw materials and geographic location but access to knowledge source. An area is attractive for technology companies specifically due to the availability of research competencies and quality of human assets (Teixeira & Tavares-Lehmann, 2014). The example of Singapore proves this thesis through practice.

In this context, it is necessary to turn the attention to the most innovative and profitable sector of petrochemical industry – fine chemistry, the global market volume of which reached $85 billion in 2010 (Pollak, 2011). Fine chemical industry creates significant demand for high technologies (Smirnov & Viktorov, 2013). According to PwC (2015), there is a clear correlation between innovation and success in growing revenues. There is already a strong consensus from fine chemicals industry that innovation can help build revenues (Keller, Belderok, Douma, & Kuhner, 2015; PwC, 2015).

Table 1. Comparative table for innovation and industrial world clusters

	Innovation petrochemical clusters	**Industrial petrochemical clusters**
The key development factors	- may be created in a territory that does not have reserves of a specific raw material; - have access to the source of knowledge, research expertise, and high-quality workforce; - related to significant government investment into the development of science, engineering, education and scientific infrastructure; - the competitive advantage:	- appeared in a large-scale production; - access to resources, transportation corridors (location in a seaport); - favorable geographic position; - created by large players with government support; - related to significant government and business investment into the development of local

	diversified range of products of high conversion in narrowly specialized niches and a new approach to handling the market. At the initial stage, innovation clusters are created with active support from the government. At the second stage, the active role is played by small, medium business and universities. The third stage should end with the development of small and medium business into leading technology companies in the relevant sector.	infrastructure.
Examples	Jurong (Singapore) Fine chemicals clusters (South Korea)	Rhein-Ruhr (Germany) Al-Jubail (Saudi Arabia) Abu Dhabi-UAE Petrochemical Cluster Tarragona (Spain) Port of Antwerp (Belgium) Alberta (Canada) Rotterdam (the Netherlands) Berre Petrochemical Cluster Swedish petrochemical cluster Petrochemical cluster of Bangkok Clusters in Tamaulipas (Mexico) North West, North East, Yorkshire and Humber regions of England and Grangemouth in Scotland (UK)

The carried out analysis enables the following conclusion. The leading petrochemical clusters are those industrial clusters that appeared around a large-scale production. The key development factors for them are access to resources, transportation corridors (location in a seaport), favorable geographic position, etc. Industrial clusters are created by large players with government support (if required).

Innovation clusters may be created in a territory that does not have reserves of a specific raw material. The competitive advantage of such clusters is a diversified range of products of high conversion in narrowly specialized niches and a new approach to handling the market. At the initial

stage, innovation clusters are created with active support from the government. At the second stage, the active role is played by small, medium business and universities. The third stage should end with the development of small and medium business into leading technology companies in the relevant sector.

As a rule, the development of a petrochemical innovation cluster is related to significant government investment into the development of science, engineering, education and scientific infrastructure. This is conditioned by the fact that the determining factor for innovation clusters is access to the source of knowledge, research expertise, and high-quality workforce. The synonym of innovation in petroleum chemistry is a fine chemical industry. Thus, the appearance of new players is mostly related to petroleum chemistry and high-margin segments.

The uniting feature of innovation and industrial petrochemical clusters is their focus on increasing the competitiveness of the territory both on domestic and international levels.

Enhanced policy implementation with the Triple Helix model

This chapter suggests answers to the key questions of the strategic session as well as presents the statements and findings identified during four months of the Association work.

The focus on the companies

Right at the first meeting of the Association of Fine Chemistry Manufacturers, the companies pointed out that they are hardly aware of each other's activities, products, and technologies. In this respect, it was decided to hold every meeting at sites of the companies, laboratories of the universities and research institutes. A meeting would start with a tour around a production site and presentation of a company – its market segment, products, financial results.

Development of partnership relations requires trust. That is why the basic requirement for collaboration was signing a non-disclosure agreement, according to which the participants could not disclose any information about the companies. In its turn, it prompted honestly and committed dialogue between the companies that allowed:

- exchanging the best equipment and raw materials suppliers, creating the list of common suppliers
- reviewing work approaches in different market segments
- sharing the best business organization solutions
- engaging with joint positions of the companies at industrial and technological exhibitions

There was also detected a lack of the companies' knowledge about scientific infrastructure, instrumentation pool of universities, the opportunities to conduct research. A number of studies and intellectual property rights, underlying certain technologies, belong to scientific institutions and universities situated in other regions. Along with that, the companies themselves are a source of new knowledge. They yearly patent new technological solutions enabling improvement of a product and a manufacturing cycle, development of their own R&D function. It makes it possible to talk about existing opportunities to create an exactly innovative cluster in the fine chemicals industry. «Production of knowledge for strengthening entrepreneurship, thereby influencing the regional economic performance is defined by researchers as the most important feature of an innovative cluster» (Fundeanu & Badele, 2014).

Development of fine chemical industry requires process-specific competences. The companies decided to start shaping research agenda and their request to the universities for specialized educational programs. This work will be carried out until the end of this year while the company members of the Association will get to now scientific infrastructure of the universities and scientific institutions, meet the leaders of the universities and relevant academic departments.

The companies got all interested in the discussion of new market opportunities. First, the companies are interested in projects in the most profitable niches – compounds, reagents, catalysts, pharmaceuticals, cosmetology, and food additives. During the joint discussion, the leaders of the companies singled out two approaches to market work. The first one is direct sales of final products. The second – introduction of products into operating processes in other industries (agriculture, transport, basic chemical production, health protection etc.), that can ensure conclusion of long-term contracts.

To carry out this strategy, the company leaders found it necessary to create special internal teams that will identify opportunities for implementation of products into the market, demand in other branches. These groups are to develop umbrella brands and product promotion strategy.

The web site of the association is regarded by SMEs as an essential element in the promotion of companies and products and it should serve as a site positioning the Association participants and organizing their interaction.

The authors believe that it's critical for an informal group to have a person that everybody trusts too. The Association is headed by the executive of one of the companies to whom all the participants trust. He has experience of operating at the international market, 20-year experience at operating at Russian market in the fields of agriculture, retail, and food industry. His reputation in the business community is beyond any doubts. Hwang and Horowitt in their book «The Rainforest. The Secret to Building the Next Silicon Valley» describe such people as keystones. «They are «mobile links» and they connect people above social market and organizational barriers. Being trust guarantors, they are able to «glue together» disparate elements of the ecosystem» (Hwang & Horowitt, 2012).

Today, he manages the company that participates in four cluster initiatives in fine chemical industry, renewable resources based industries, the timber industry and pharmaceuticals. Solagift LLC is a company that researches and develops bioactive substances from plant products and creates technologies of receiving such substances from coniferous (evergreen) trees to be used in pharmaceutical, food, cosmetic industries, cattle breeding and agriculture. This is a rare example of a company where unique production technologies ensure active cooperation with different enterprises from various industries and opportunities to implement cluster projects. The authors suggest to include a description of the role of such people in cluster initiative launch into the concept of clusters in Triple Helix framework, and to draw attention to their potential in uniting interests of representatives of three institutional areas.

SMEs are at the stage of shaping their expectations of the public support and they believe that the current programs of SME support are ineffective. They said that support should be more targeted, prompt and focused on the achievement of tangible results in specific niches. From the viewpoint of the companies, the overriding term for their success is a simplification of customs and export procedures, subsidy programs for product certification at foreign markets.

Specific nature of the fine chemical industry is about technology try-out and achievement of required product characteristic in small volumes (kilograms, liters). In case the required operational parameters are achieved and the product is in demand, it is necessary to shortly set up its

production in large volumes (several hundred tons). This transition is the most critical for companies and requires new production sites, specialists and regional government support (including land lots etc.).

The focus on the universities

Universities are largely focused on lots of industry-sponsored research. Their studies and educational programs are designed for the needs of major players. That's why so far the universities are not completely ready to work together with SME's. They have to develop the interface to work with small technology companies that will make them able to swiftly respond to their requirements and gradually expand their role in the initiative as competence centers. One of such interfaces can be the Engineering Center for Chemical Technologies established on the base of National Research Tomsk State University. This is a hybrid organization that puts together needs of small and medium-sized business and competencies of research groups. It carries out independent studies for the purpose of new business development.

The focus of the federal and regional authorities

During the discussion, it has been found out that the federal ministries' "radars" are only able to see large projects as the ones to finance within the existing supportive measures. These projects are mainly implemented by industrial clusters.

Moreover, regional authorities primarily pay regard to large companies and major taxpayers. For that reason, a zone of new economy sector development, for example, fine chemical industry, can go unnoticed by the federal and regional government. Along with this, the state agents supported cluster initiative in the fine chemical industry.

Cluster initiative in fine chemicals requires policy reexamination by the regional government that targets to work with government-owned corporations, large private sectors and federal ministries and sees success as the attraction of lots of investments, job growth. The present day, SMEs try to shape their request for changes in government support. The following questions will have to be answered: what are the requirements to export support, business environment, and support of industry projects on the development of high added-value products for highly profitable niches.

Focus areas of reciprocal enhancement of SMEs, universities and regional government is discussed at the Association meetings on monthly basis. The

core principle of its work is the equality of votes of every Triple Helix participant.

Recommendations for further cluster development

Cluster initiative in small chemicals generates opportunities to reinforce cooperation among smaller chemical enterprises, as well as with related industries (machine building, IT, pharmaceuticals etc.), universities, research institutions and regional government.

An important lesson for regional cluster policy can lie in the fact that a cluster initiative, based on the leading role of SMEs, is likely to be the most sustainable, diversified and balanced initiative. The absence of a prominent leader (a large company), that other members would need to adjust to, will allow them making the whole cluster independent of success or risks of one company.

Development of fine chemical industry as an innovative area of the petrochemical market creates opportunities for innovation cluster formation. Successful implementation of cluster initiative in fine chemicals will let SMEs control value-adding chain of the fine chemical industry of Tomsk region and occupy the upstream of industry chain within the clusters.

Universities should not focus their research agenda and educational programs only on major players but should turn to SMEs as well. This way, they will be able to become important participants of innovation clusters. One of innovation cluster's five dimensions is the role of research institutions and universities as centers of excellence, creating demand for products, processes, and services (Fundeanu & Badele, 2014). To assist the development of cluster initiative in the fine chemical industry, it's necessary to reinforce the proactive role of universities and research institutions.

The next point is that cluster initiative in fine chemical industry encourages changes of the regional government investment policy. Regional government focuses on three types of investors. Investors of the first type are interested in access to raw materials. In this case, all added values from raw material advanced processing will go to economies of other regions and countries. Investors of the second type care for market access (as a rule, it is mass-consumption product manufacturers). The third type of investors is interested in competencies available in the area. Among these are research

activities, specialized educational programs, the current development of innovative solutions, and quality of labor forces. The authors believe that regional investment policy focus on attraction of investors of the third type will enable the creation of new process chain in the fine chemical industry and specialty chemicals in the most profitable segments, including reagents, compounds, pharmaceuticals, cosmetology and food additives.

From now forward, the authors will participate in the implementation of the following measures designed to carry out cluster initiative in fine chemicals at the territory of Tomsk region:
-Kick off strategic projects the joint implementation of which will be interesting for all cluster participants and that will be designed to increase performance efficiency of every particular participant.
-Develop mechanisms of interaction between the Association of Fine Chemistry Manufacturers and regional government which will focus regional policy on priority support areas of SMEs in the fine chemical industry.

Conclusions

The key condition to kick off cluster initiatives at the regional level is the availability of framework for cluster policy that will be shared by all stakeholders and ensure intensification of the collaborative links between Triple Helix actors. In Tomsk region, this framework is the INO Tomsk Project. The framework for cluster policy should enable both identifications of historically- and evolutionarily-formed clusters and accelerate Triple Helix based cluster initiative in various areas.

Cluster initiative in the fine chemical industry is the Triple Helix based cluster initiative. Tomsk region experience shows that such initiatives are more sustainable than initiatives developed by two players – «government-universities», «industry-government» or «industry-universities». A key factor of successful cluster initiative in Tomsk region is the participation of SME`s, universities and scientific organizations as well as the support of regional authorities. The example of a chemical cluster is not an exception, and currently, the work is being done to find more efficient formats of cooperation of Tomsk small chemical enterprises with universities and regional government in order to implement cluster initiative.

Development of Triple Helix based cluster initiative allows expecting changes in regional policy, universities research agenda, and educational programs. At the same time, it requires the creation of special Triple Helix-

formats. One of them is the Association of Fine Chemistry Manufacturers. It enables alignment of positions of SMEs, regional government and universities regarding the issues of cluster development, changes in business model, regional policy and research trends in universities and research institutes.

Triple Helix based cluster initiative is characterized by the presence of a leading player. This player is a source of requirements for all Triple Helix participants. In the case of innovation cluster creation in the fine chemical industry of Tomsk region, this player is small and medium-sized technology companies. On one hand, they take charge of the regional government functions elaborating the vision of fine chemical industry development. On the other hand, they largely establish research agenda taking over the function of universities and research institutes. Universities can become the center of a cluster if they manage to launch special purpose studies, educational programs and start elaborating the vision of fine chemical industry development in global and regional contexts.

Implementation of a cluster initiative in the chemical industry is about reliance on small and medium enterprises, as well as the related industries, including machine building and automation. Initially, the INO Tomsk Project concept assumed the major petrochemical companies of Tomsk region and Russia to be key participants of the cluster. However, in the course of the past year, it became obvious that small petrochemical companies should be the core of the cluster. Such companies, cooperating with each other and with companies from related industries, are able to integrate with major petrochemical enterprises, offer their products and become significant participants in the petrochemical industry development.

The possibility of innovation cluster creation is determined by the availability of competencies at the region territory, quality of labor resources, availability of specialized educational programs, development level of the institutional environment.

Fine chemical industry development basis is small and medium-sized companies united into an innovation cluster. Products of companies are diversified and represented at various branches, which enable their cooperation with a wide range of industries.

SMEs-based clusters can aim at being globally competitive in specialized highly profitable niches of world market if there formed a common vision and created a mechanism to spread knowledge about market development.

In Tomsk region, all Triple Helix participants believe the paramount task to be positioning and promotion of SME's products in specialized and highly profitable world market niches. Further, SME's made a request for a new role of regional government that would no longer consist in the attraction of large companies but in the creation of favorable conditions for implementation of joint projects by small enterprises, in the development of a new process chain.

Each of Triple Helix participants is interested in finding their benefits from cluster initiative execution. For the government of Tomsk sees clusters as one of the tools to stimulate industrial and innovation-driven development that will take into account specific features of the region. For business, it's an effective way of joint efforts, expansion of production capacity, cost reduction, implementation of efficient marketing measures, the pursuit of lobbying. For universities and scientific institutions, it's an opportunity to expand advanced research and development works, special programs for a skilled workforce.

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