SPECIAL ECONOMIC ZONES IN THE DEVELOPMENT OF INDUSTRIAL AGGLOMERATIONS IN RUSSIA

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Abstract: *The research focuses on the emergence of the Titanium Valley Special Economic Zone (SEZ) in the Urals Region of Russia by combining empirical evidence with the theories of industrial agglomerations and spatial clusters. On the basis of a comparative analysis the empirical data on the economic relations in the Urals Region of Russia focusing on the emerging Titanium Valley SEZ are presented. While the cluster approach seems to be effective in this context, the evolution of industrial agglomerations in transition economies differs significantly from that in the developed countries due to a path dependent affiliation with command economy, state-dominated development, lack of economic freedoms, and rigid regional economic policies. These differences account for the divergence from the evolutionary pathways of industrial agglomerations that have been scrutinized and categorized in developed countries. Finally, we will take a look at specific cluster policies implemented in the Urals Region in order to evaluate their role in promoting regional economic growth and resilience.*

Key words: *industrial development, agglomerations, special economic zones, clusters, transition economy*

JEL codes: *R50, R58*

1. Introduction

Industrial cluster policies are key and widely used tools for economic development in local and regional economic development planning. Industrial clusters, i.e., groups of geographically proximate companies within a similar industry, are believed to enhance employment, diversify exports and transfer technology and managerial know-how (Sosnovskikh, 2017).

Crucial elements of the industrial cluster model include the provision of a collaborative and competitive environment, an appropriate geographical location and proximity to resources, related and supporting firms, and state regulations and strategic programs that facilitate innovation and productivity. The formation of industrial clusters is an important part of governmental policies and regional development in Russia. Some internationally competitive industrial zones originated in the former economic regime, such as conglomerates in the oil and gas

sectors, the aluminum and airspace industries, and military and strategic defense. Among the determining factors in 2005, President Putin signed a decree, No. 116- Federal Law "Establishment of special economic zones (SEZs) in the Russian Federation", which envisioned four types of SEZs: industrial, innovation, tourism, and port and logistics zones. This paper focuses predominantly on industrial SEZs, as industrial development is a core objective for the Russian economy.

In this paper we explore the emergence of the Titanium Valley Special Economic Zone (SEZ) in the Urals Region of Russia by combining empirical evidence with the theories of industrial agglomerations and spatial clusters. First, after a brief comparative overview of the theoretical bases, we will present the empirical data on the economic relations in the Urals Region of Russia focusing on the emerging Titanium Valley SEZ. Second, we will demonstrate that while the cluster approach is effective in this context, the evolution of industrial agglomerations in transition economies differs significantly from that in the developed countries due to a path dependent affiliation with command economy, state-dominated development, lack of economic freedoms, and rigid regional economic policies. These differences account for the divergence from the evolutionary pathways of industrial agglomerations that have been scrutinized and categorized in developed countries. Finally, we will take a look at specific cluster policies implemented in the Urals Region in order to evaluate their role in promoting regional economic growth and resilience.

2. Industrial agglomerations in high-income economies: literature review

Alfred Marshall's conceptualization of spatial concentrations of industrial activities created a lasting theoretical framework encompassing most debates on structure and functionality of industrial districts, spatial clusters, and territorial innovation systems under the general umbrella of industrial agglomerations. While Marshall's originally formulated industrial district was a business structure comprised of locally owned firms with relatively low scale economies (Marshall, 1920), it was later defined as a sizeable and spatially delimited area of trade-oriented economic activity which has a distinctive economic specialization in either resource, or manufacturing, or service field. In the 1980s the Marshallian model was rejuvenated by case studies of the Italian industrial districts (Piore and Sable, 1984), later extended to other regions including the Silicon Valley (Saxenian, 1994). The organization of production in these industrial districts, based on prevailing small size firms, was characterized by flexible horizontal integration, local firm networks, and a strong role of local governments in regulating and promoting core industries enabling the evolution of local identity and shared industrial expertise.

Though it seemed tempting to proclaim the Italian type industrial districts as models of lasting regional economic success, the areas of economic attractiveness and resilience proved to be extremely diverse in terms of their corporate strategies, industrial structures, profit cycles, state priorities, and local and national policies. At least three types of non-Marshallian industrial districts, successfully competing regionally and globally, were identified based on a firm size distribution, a degree of vertical integration, the organization of production, networking, governance structure, and innovative capabilities. First, there are hub-and- spoke districts that unlike the Italian model of small-firm industrial communities are dominated by one or several large, vertically integrated firms surrounded by smaller suppliers. The dynamism in hub-and-spoke economies is determined by the position of their anchor organizations in domestic and international markets. Districts of that kind lack the most acknowledged feature of the Italian type districts, namely, local venture capital specially tailored to start-ups in their industry (Kenney and von Burg, 1999).

Second, satellite platforms, dominated by large, externally owned and headquartered firms are distinctively different from hub-and-spoke districts, where large firms or institutions are locally based. The major feature of a satellite platform district is the absence of any connections or networks within the region and the prevalence of links to the parent corporation elsewhere, which is especially conspicuous in non-local sources of finance, technical expertise, and business services furnished through corporate headquarters.

Finally, state-anchored districts with public, non-profit, or governmental entities as key players owe their emergence to military bases, defense plants or state universities. In these districts, scale economies are high and government contracting encourages the development of long-term supply relationships; however, indigenous firms play a much smaller role than in Italian or hub-and-spoke districts. Growth prospects in state-anchored districts depend on the stability of the anchor facility and the governmental policies on local firm encouragement.

The concept of spatial clusters of innovation, an offshoot of the theory of new industrial spaces, underscores the role of local institutions and culture in combination with industrial structure and corporate organization for creating lasting competitive advantage (Saxenian, 1994), thus intersecting with the concept of industrial districts. The cluster concept creatively developed Michael Porter's (1998) original model, which emphasized market conditions and competition as success factors, and upgraded it to regional dimensions of innovation by adding the factors of networking and social interaction as other sources of success (Moulaert and Sekia, 2003).

The cluster terminology is diverse and embraces a vast range of meanings, from simple spatial and sectoral concentrations of firms (Bresnahan and Gambardella, 2001) to more comprehensive "geographically proximate

groups of interconnected companies, suppliers, service providers, and associated institutions in a particular field, linked by externalities of various types". Localized clusters of economic activity are viewed as "elementary particles" of the global economy that are embedded in regional industrial networks within national and regional political and regulatory systems. Specialized clusters reflect the tendency for firms in closely related industries to form industrial districts or agglomerations, thus generating interdependencies between firms that facilitate face-to-face contacts, social and cultural interaction, and enhancement of knowledge and innovation.

The cluster-related literature encompasses three major themes deemed responsible for lasting regional economic performance. The first theme is path dependence or how today's realities are based on yesterday's events or processes. This historical approach attributes the emergence of clusters to natural or social factors endemic to a particular location that stimulate a certain kind of activity by local entrepreneurs. While there is a relative consensus among economists and geographers that "old economy factors are crucial for new economy outcomes" (Bresnahan and Gambardella, 2001, p. 858) it is clear that even for relatively accomplished regions, such path dependency does not imply the absolute inevitability of success.

The second key theme embraces the nature of innovation, the processes of learning, and knowledge creation in clusters. The emergence of a strong, concentrated talent pool in local and regional economies serves as a key factor in launching individual clusters along the path to sustained growth. The quantitative analysis of various growth factors in clusters shows that such embedded socioeconomic conditions as local market rigidities, human capital, and regional scientific base make a region either innovation prone or innovation averse. The most successful clusters effectively build and manage a variety of channels for accessing relevant knowledge, both from local sources as "local buzz" and from around the globe as "global pipelines" (Bresnahan and Gambardella, 2001; Wolfe and Gertler, 2004). The latest analysis of knowledge creation in clusters in developing countries such as Brazil, China and India suggests that in addition to the Marshallian view of localized learning the globalization process has brought in "distant learning" as a mechanism of building external linkages and accessing external innovation sources.

The third key theme in explaining sustainable success and resilience is the role of legislation and public institutions. Governmental role lies in ensuring the supply of educated citizens and physical infrastructure and setting the rules of competition by protecting intellectual property and enforcing antitrust laws. The aim of cluster policies is to reinforce the development of all clusters, in contrast to the traditional industrial policies which favor only "desirable" industries (Porter, 1998). Direct public-policy efforts to jump-start new clusters or to emulate the success of the Silicon Valley in different historical and economic conditions, however, rarely produce the desired effect (Kenney and von Burg, 1999; Bresnahan and Gambardella, 2001). On the contrary, accommodative government policies can be an important part of cluster development, as shown by the example of regional development in China's Pearl River Delta, which has grown 16% per annum since 1979.

Regional Innovation System (RIS) approach has been introduced to define "new" models of regional development that manage to overcome structural economic weaknesses of industrial districts and clusters, with the emphases on innovation as a driving force of competitive advantage and on local development potential as an alternative to national economic policies. Such growth factors as human capital, local business culture, infrastructure and educational system, accumulation and transfer of knowledge, and learning from regional experience were put in a context of territorial innovation development (Moulaert and Sekia, 2003). Similar to industrial districts, the RIS concept stems from Marshall's theory of economies of agglomeration (Marshall, 1920) merging it creatively with the regional endogenous development theory, the theory of evolutionary economics, and the learning region theory.

Some researchers differentiate between the concepts of spatial clusters and the RIS concurring that though clusters as knowledge-intensive forms of production are similar to the RIS, they are not as complex and inclusive. Clusters are often viewed as important components of RIS, which may consist of interacting knowledge generating networks linked to global and national systems while a cluster of firms may exist in a geographic area without networking relationships (Asheim et al., 2011). Geographical proximity to the creation and maintenance of learning dynamics for firms in clusters plays an important role; however, it is neither a necessary nor a sufficient condition for learning to take place as four other dimensions of proximity: cognitive, organizational, social, and institutional, may have both positive and negative impacts on innovation in clusters and RIS.

In spite of the plurality of conceptual approaches, there is a general consensus that industrial districts, RIS and spatial clusters of economic activity generate agglomeration economies and lead to innovation and growth.

The recent increase in foreign direct investment (FDI) in industrial agglomerations sought and promoted by local and regional authorities poses a question whether a cluster process can be generated by foreign investors and whether policy-makers should pursue the FDI mechanism for promoting regional growth. It was suggested that in order to capture external economies from FDI, such investment must enter existing indigenous clusters and thus cluster policy should not focus on generating new clusters through the FDI mechanism. However, the new empirical studies show that in case of small open economies where the economy can be too limited indigenously to build a competitive sector, the policy-makers' attention to promoting the capabilities of

emerging indigenous base by attracting additional FDI can result in a successful cluster creation.

The final consideration is whether all spatial agglomerations are essentially innovation clusters characterized by knowledge spillovers and linkages. Agglomerations of industrial activity can be just "blobs" of firms that happen to be co-located or they may indeed represent clusters characterized not only by geographic proximity but by startup spinoff process, networking, and unintended spillover of knowledge. While the bulk of the most impressive empirical data that lead to the development of cluster – RIS theoretical framework has been accumulated in high-income economies, predominantly in the EU, the USA and Canada, the data from the emerging markets have just started building up (Breznitz and Murphree, 2011; Sellar et al., 2011). In spite of a growing popularity of the cluster concept in academic and policy circles, the clusterization process in transition economies has been hampered by a variety of path-dependent factors. In the next section we will examine the development of cluster theory and economic policy implications in Russia.

3. Cluster Approach in Transition Economies

In Russia, the idea of innovation clusters was embraced only in the first decade of the 21st century but promptly triumphed over the model of territorial- production complexes (TPC), traditionally embodying the spatial elements of Russian regional development. From the beginning of the 20th century, a TPC was viewed as a regional combination of different production cycles defined as groups of interrelated economic activities based on the processing of raw materials and utilizing a particular energy source. Conceptual overlapping of territorial-production complexes and production cycles created challenges in quantitative evaluation of regional specialization and cost-effectiveness of industrial linkages within a TPC. In contrast to rigid territorial-production complexes, industrial districts and clusters represent more efficient forms of spatial organization allowing companies to operate productively in sourcing inputs, accessing information, technology and needed institutions, coordinating with related companies, measuring and motivating improvement.

Though an industrial agglomeration approach represents the most generalized conceptualization of a spatial model of regional development and an RIS approach offers a broader framework for regional innovation theory and policy, the cluster approach has been the most popular in policy circles thus far (Asheim et al., 2011). The most plausible explanation is the global marketing of a positive brand image of clusters as the vehicles of innovation and competitiveness. Indeed, today it is widely acknowledged in Russian economic science that in the contemporary globalized world efficient technological competition is impossible without a so called "cluster policy" understood as "a set of measures directed at raising a country's competitive edge through cluster development support". Analyzing the diversity of cluster policy applications in various countries, Russian economists emphasize the dichotomy of a "continental" cluster development model typical of Sweden, France, Italy, Japan and South Korea, versus an "Anglo-Saxon" model utilized in the USA, Great Britain, and Australia. In a former model, a state has a strategic priority in selecting prospective innovation clusters and in financing key projects thus contributing to the ultimate success of their activity. In a latter model, the genesis and evolution of an innovation cluster is largely attributed to a free market competition with a necessary spin-off of multiple startup companies (Pyatinkin, 2008).

In Russia, where the state has traditionally played a highly prioritized economic role, the "continental model" cluster synergy has turned into an instrument of regional development. State and local authorities have been branding spatial clusters as channels for increasing regional investment attractiveness and enhancing regional brand images rather than accentuating the role of clusters in innovation process. Similar situations have been described in China and Eastern European countries (Breznitz and Murphree, 2011; Sellar et al., 2011) where, like in Russia, transition to free markets has been hindered by the legacy of command economy and heavy reliance on central government grants, state-owned enterprises, and state involvement in regional decision-making.

The European Commission views clusters as predominantly market-driven phenomenon acknowledging, however, that forward-looking public policies implemented in the EU since the 1990s have been instrumental in the emergence of strong clusters (European Commission, 2008, p. 3). The Commission emphasizes the major goal of clusterization as fostering "a fertile environment for SMEs to innovate and develop linkages" (European Commission, 2008, p. 8). This focus on cutting-edge innovation has been "exported" from the developed EU members to the post-socialist transition economies where traditional cluster policies came into conflict with the priorities of injecting new capital into cash-poor economies and reforming the public sector (Sellar et al., 2011).

In China, the 11th five-year plan of national economy (2006-2010) formulated the cluster policy that would improve international competitiveness as an alternative to a "big and complete" planning tendency (Zhu, 2009; p. 139). However, in contrast to the EU cutting-edge innovation cluster approach, many Chinese top-down industrial agglomerations, often organized in "constructed" technoparks and fully controlled by foreign multinational corporations and state- owned enterprises, do not engage in novel-product creation. It is especially typical for the Shanghai IT cluster where the local government interferes into business location and investment decisions ignoring the startup and SME interests in favor of large-scale state-owned companies. As a result, the

industrial agglomeration spatially disconnected from research institutions can sustain high growth rate and improve productivity but lacks innovative spirit, knowledge spillovers and spontaneous startup spinoffs (Breznitz and Murphree, 2011).

There are certain similarities between the top-down cluster models in China and Russia where regional cluster policies that locally reduce market rigidities aim at attracting foreign investment and federal grants. In the Russian Federation's long-term economic development program "Strategy-2020" the cluster policy stays as a fundamental concept prescribing the establishment of regional innovation clusters in the near future. In practice, clusters are incorporated in Special Economic Zones (SEZ) which are given special legal status and economic privileges in order to bring domestic and international investors into targeted priority industries. Since 2006 the Russian SEZs have been managed by the state-owned Special Economic Zone Joint Stock Company (JSC SEZ). The federal government has invested over $1.5 million in the special economic zones seen as major conduits for attracting FDI into regional agglomerations of specialized manufacturing, research, and tourism. The recent amendment to the federal law "On Special Economic Zones of the Russian Federation" No 365-FZ from November 30, 2011 sanctions the creation of industrial clusters within the SEZs while also raising their longevity from 20 to 49 years and increasing a permissible area from 20 to 40 square kilometers (Titanium Valley-Improvements for Investors 2012).

The federal program "Strategy-2020" stipulates the creation of the "Titanium Valley" Industrial Special Economic Zone in the field of aerospace technologies in the Central Urals's Sverdlovsk Region. In the next sections we will provide a brief economic overview of the Sverdlovsk Region and a current status of the evolving SEZ "Titanium Valley".

4. Sverdlovsk Region in Transition Economy

Complex transformational processes in the Russian economy in the XX century have led to unprecedented experimentation with the world economy (Ilyushkina and Stepanov, 2013). Russia's Sverdlovsk Region is an administrative unit in the Urals Federal District, with the center in the city of Yekaterinburg. The Urals is one of the oldest resource-based industrial regions in Europe dating back to the beginning of the 18th century. The Urals experienced a destructive decline during the first post-Soviet decade due to inflexibility of the inherited resource-based industrial structure. Ferrous metallurgy, the Urals' traditional industry, suffered its deepest crisis since the 1920s, with a 52% decline in the production of iron ore, a 48% decline in pig iron production, and almost a 60% decline in steel making accompanied by a dramatic decrease in state funding for the nation's largest military-industrial complex (Givental, 2009). However, by the turn of the 21st century a revitalization of venture entrepreneurship and export activity has spawned a 6.8% industrial growth and the unemployment level decreased from 10% to 2.45% (Shaban, 2006). Today, the Urals mines 97% of Russian vanadium, 65% of iron ore, and 70% of aluminum ore. It is located on the transportation crossroads from Europe and North America to Asia neighboring the major energy-producing regions of West Siberia, Timan-Pechora, and Western Kazakhstan. As a result, the Urals is viewed as a catalyst for the formation of Russia's unified economic space.

The post-Soviet Sverdlovsk Region, the Urals' core, inherited a highly concentrated military-industrial complex with full cycles of mineral extraction, metallurgy, and machine building. The region's heavy industry is organized into several large industrial agglomerations. Over 80% of the enterprises were privatized in the mid-1990s and represent open stock or closed stock companies. By the year 2000, Sverdlovsk Region had over 5400 registered large and medium size enterprises. The most common are vertically – integrated regional holdings, combining industrial enterprises with regional banks and investment companies.

Sverdlovsk Region has inherited over 250 high tech research units, and it is endowed with Yekaterinburg Ural Federal University, the largest and the oldest educational center in the Urals, founded in 1920 and currently enrolling over 50,000 students in its 20 departments. Building on its path dependent experience, the region has been creating vertically integrated corporations with high FDI participation and an emphasis on R&D in the form of techno-parks or technopolises developed on the basis of the Urals' traditional raw material extraction in combination with the former military-industrial complex facilities. Joint ventures have become a major form of FDI reaching over 700 by 2005 (Givental, 2009).

The evolving dualism of the region's economy with the presence of path-dependent vertically integrated highly concentrated enterprises on the one hand and the increasing commitment to innovation technopark-structured export-oriented activity on the other will be examined in the next section drawing on the Titanium Valley SEZ example. Since the goal of this study is to investigate an emergence and early evolution of a typical industrial agglomeration in a transition economy, the authors used a case study approach utilizing the data available on the local and national websites as well as in the current media.

5. The Emerging Titanium Valley Special Economic Zone

The new industrial agglomeration, ambitiously termed the "Titanium Valley", is now emerging in Sverdlovsk

Region. It is located in the special economic zone in Verkhnyaya Salda, a city 180 kilometers north of Yekaterinburg. The official announcement declaring the establishment of the SEZ "Titanium Valley" in Sverdlovsk Region came in the fall of 2007; two years after the Government had adopted Federal Law No 116-FZ "On the Special Economic Zones in the Russian Federation". According to the project, the SEZ Titanium Valley will attract 65 industrial residents and $2.6 billion in private investment and create 13 thousand jobs. The Federal Government has pledged $550 million in immediate SEZ infrastructure investment. As a federal program, incorporated in the Russian Federation's Long Term Plan on Economic and Social Development the Titanium Valley is a top-down pilot project of a high tech cluster.

While the Federal budget and the budget of Sverdlovsk Region equally contribute 25% of the total SEZ's budget, almost half (48.2%) of the financing is projected to come from foreign capital. The investment agreement between the Ministry of Economic Development of Russia and the Sverdlovsk Region Government specifies that the region is responsible for professional training, techno park development, and infrastructure maintenance. The regional government provides a substantial financial support to the economic zone participants who will be exempt from property tax, land tax, and the regional budget part of the income tax. The companies – SEZ residents are allowed to carry out only industrial activities specified by the agreement. In the first three years each resident is expected to invest at least $4.8 million in the project. In exchange, the residents are guaranteed the benefits of fast document preparation, a supply of qualified technical and research personnel, and ready-to-go infrastructure including residential accommodation for all foreign participants. The availability and quality of labor resources is of great importance for the economy of any country (Rodionova, 2017).

The industrial basis of the economic zone is VSMPO (Metal-producing Company of Verkhnyaya Salda) Avisma Corporation, a vertically integrated mining-manufacturing enterprise producing 20% of the world's titanium sponge and alloys. The corporation manufactures titanium slabs and ingots as well as round and flat mill products made of strong light weight titanium alloys widely used in the aerospace industry. In the times of command economy, the corporation was an essential part of the Soviet military-industrial complex; however, in the conversion framework of the 1990s, Avisma turned into a public open stock company. Avisma's R&D has developed a unique technology of manufacturing fine grain aluminum-vanadium-titanium alloy for airplane engine and wheel manufacturing which allowed the company boosting its competitiveness and developing a network of subsidiaries in Ukraine, Germany, the UK, Switzerland, and the US, cooperating with 345 foreign companies as suppliers and customers (www2). According to the company's corporate statistics, between 2000 and 2010 Avisma's overall titanium manufacturing had grown 3.5 times. In 2010, Avisma manufactured 35.5 thousand tons of titanium products exporting 81.4% of its production The Corporation is diversifying its production by entering new non-aerospace market outlets, such as nuclear power, pipes for petroleum, sports, and construction equipment.

LLC VSMPO-New Technologies, Avisma's subsidiary, officially became the first SEZ Titanium Valley resident on August 17, 2011, with an initial investment of $50 million. In December 2011, it was followed by LLC Synersis, a subsidiary of the Yekaterinburg Electrical Machine-Building Plant.

In December 2007, Boeing Corporation and VSMPO-Avisma created a joint venture, Ural Boeing Manufacturing (UBM), which started the production of spare parts for Boeing 787 Dreamliner in 2009. The latest Boeing Corporation plan involves a construction of a titanium processing plant in the Titanium Valley which will require a capital investment of $20 to $50 million. UBM will perform the initial mechanical processing of the titanium produced by VSMPO-Avisma. Titanium flakes will then be delivered to VSMPO-Avisma for reprocessing thus creating a unique closed technological network. This arrangement is viewed as mutually beneficial as it will reduce Boeing's production costs and improve the Titanium Valley's standing among prospective investors.

In July 2008, VSMPO-Avisma signed an agreement with Airbus and its shareholder EADS (the European Aerospace and Defense Company) to supply titanium aircraft parts through 2020. In July 2011, an additional agreement specified that VSMPO-Avisma would supply Airbus with titanium wheel parts for Airbus A-350. Several industry-related companies, both domestic and foreign, have also expressed interest in joining the evolving cluster (table 1).

Though several Russian and foreign companies working in the aerospace field have immediately expressed interest in joining the Titanium Valley SEZ, the organizational phase took longer than expected. The interested parties are not rushing into making contractual commitments probably due to the perceived problems associated with doing business in Russia. The major concerns of the prospective investors involve a timely creation of permanent infrastructure as well as the issues of ever-changing tax legislation in Russia. The first stage of construction was scheduled to start in the summer of 2012 but was delayed due to the change of leadership in the region. Corruption and doubtful business practices are also seen as an impediment to a successful start of the Titanium Valley SEZ. In contrast to a lukewarm enthusiasm of foreign investors, VSMPO Avisma that has been present in the city of Verkhnyaya Salda since 1941 is actively engaging in signing contracts with the main prospective SEZ residents. The corporation's general director announced recently that the company might start the construction of a new manufacturing facility on their own territory if the first stage of the Titanium Valley

infrastructure were not completed on time.

Tab. 1 Residents of SEZ "Titanium Valley"

Company name	Fields
Titan-Aluminum Feingass LLC, Germany	Aerospace castings, titanium- aluminum sheet, plate and manufacturing foil
VSMPO – New Technologies, Russia	Machine working of titanium alloys
Snecma, France	Aircraft manufacturing
Rolls Royce Control Systems LTD, UK	Aero engine controls
MAG Aerospace Industries, USA	Supplementary equipment
Pratt & Whitney Engine Services, Inc., USA	Aircraft engines and engine parts
Siemens AG, Germany	Engine manufacturing and turbine equipment
Alfa-Laval, Sweden	Fabricated structural metal manufacturing
ZAO Mashprom, Russia	Heavy engineering
Turbine Engine Component Technologies TECT, USA	Aircraft engine, parts, equipment manufacturing and
Zibus, Russia	Medical equipment
Nordbasalt, Russia	Basalt technologies
Inferkom-Ural, Russia	Manganese Alloy production

Source: (www1)

Advantages and disadvantages of the cluster are represented in table 2.

Tab. 2 SWOT-analysis of the potential threats to the cluster development

Positive influence	Negative influence
Location: 250 km from the federal area of Yekaterinburg which is the third biggest territory in Russia	Poor infrastructure development
Logistics: access to the main transportation hubs	Low economic demand, far from the strategic ports
Huge industrial enterprises in the region	Polluted environment
Sufficient Labor Force	---
Experience in industrial development	---
---	High level of rivalry among the companies in the region
Global market access	Serious influence of Chinese industrial trends
Favorable conditions for the residents in terms of taxation	Legal issues are not worked on
Effective cluster formation in the area	---

Sources: (www1)

6. Conclusions

"Titanium Valley" is one more example of the world's obsession with regional labels based on the Silicon Valley model (Wolfe and Gertler, 2004). The key factors that support Silicon Valley's formula for success have been vastly debated over the last years. It has been emphasized that "where Silicon Valley is entrepreneurial, decentralized, and only loosely and flexibly connected to broader national institutions, many efforts at imitations have been government sponsored, top down or rightly linked to established firms" (Bresnahan and Gambardella, 2001, p. 836).

Path dependence and the "old economy" elements that can catalyze the development of new clusters (Wolfe and Gertler, 2004; Bresnahan and Gambardella, 2001) are present in both the Titanium Valley and the Silicon Valley. Having started as parts of the respective military-industrial complexes, both experienced dramatic cutbacks in defense spending – the Silicon Valley in the mid-1980s (Kenney and von Burg, 1999) and Sverdlovsk Region in the 1990s after the collapse of the Soviet Union. Both regions share a history of long-term investment in education and skilled labor force. The differences, however, are more pronounced. The Titanium Valley is based on the enormous vertically integrated magnesium- titanium corporation VSMPO-Avisma. Michael Porter (1998) emphasized the importance of flexible horizontal cooperation instead of vertical

integration within the cluster, and Anna Lee Saxenian (1994) argued that one reason for the Silicon Valley downturn in the mid-1980s was its highly vertically integrated organizational structure that made it rigid, bureaucratic, and oblivious about the external environment. Kenney and von Burg (1999, p. 69) acknowledged the importance of a "second economy" to encompass "a variety of institutions specializing in facilitating new firm formation" and capable of nurturing the growth of small start-ups, such as those which eventually turned Silicon Valley into an "incubator region". The necessary dramatic explosion of new entrepreneurship in Russia, however, has been restrained by corruption, lack of business legislature, and rigid regional economic policies. The Titanium Valley, with embedded highly qualified human capital and regional scientific base but without indigenous knowledge spillovers and local business spinoffs may very well be another case in point.

The empirical data, however, show that the evolutionary paths for cluster creation are highly variable (Wolfe and Gertler, 2004). Since they often depend on public sector decisions, the implementation of the top-down approach utilized in the Russian Federation can make the case for a possible success of promoting regional growth in transition economies by attracting FDI through cluster policies.

In spite of recent reports of infrastructure stagnation in the Titanium Valley, the Sverdlovsk Region government has shown enough flexibility to establish a favorable business climate by offering reduced taxes and duties in the special economic zone and by aggressively promoting the investment process.

The comparative analysis of industrial agglomerations in various economic settings confirms that the deliberate top-down cluster-building process in transition economies has inherently different priorities. The need for an FDI influx in the conditions of low local capital activity and regional rigidities inherited from the former command economies leads to the establishment of localized zones of economic activity that may significantly improve regional economic indicators and job creation but fail to create the Silicon Valley-type innovation clusters examined in high-income economies.

The questions whether a "distant learning" process through cooperation with foreign companies in special economic zones and techno parks results in similar conditions as indigenous knowledge spillovers and whether FDI-inspired non- innovation agglomerations in transition economies create similar regional effects as innovation clusters are still to be answered. The Titanium Valley as a top down model of industrial agglomerations, co-sponsored by federal and regional governments in their effort to promote cluster policies and attract FDI, and based on a vertically integrated extractive-manufacturing enterprise, has not passed the resilience test yet. The longitudinal analysis of Titanium Valley's evolution from its inception may become a valuable case study for regional performance in transition economies.

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