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## **Innovative Clusters Development: Polish Experience for Ukraine while Building Triple Helix Ecosystem in Agribusiness**

**Abstract.** The article is dedicated to the investigation of international experience on innovative clusters development in agribusiness from two different angles (on the example of the whole of Poland and of the Warsaw University of Life Sciences Cluster of Innovation in Agribusiness, in particular). The current Ukrainian innovation model is analyzed and compared to the Polish one, within the EPIC framework. Principal lessons Ukrainian policy-makers can learn from Polish experience are identified and analyzed through the prism of SWOT as long as some recommendations for national innovation development strategy are provided.

**Key words:** cluster, innovations, agribusiness, triple helix, innovations development framework, innovation models, Poland, Ukraine

### **Introduction**

Recent world globalization processes have resulted in situations where simple scientific research and inventions of new products have been outrun by the commercialization of innovations. In this paper we will focus on clusters as a way of bringing the actors of innovative processes closer in order to improve competitiveness, get access to new technologies, and make the process of implementing innovations cheaper, faster, and easier in agribusiness. M. Porter in his 'The Competitive Advantage of Nations' (1990) described so-called first clusters (business cluster, competitive cluster), which referred to geographic concentrations of interconnected businesses, suppliers, and associated institutions in a particular field. Clusters evolved into something more complicated and the phenomena of 'regional innovative models'; however, they are still based on the integration of different market players for creation of mutual benefits. Today they are represented by clusters themselves, techno parks, industrial districts, resource areas, competence blocks, networks, local production systems, and others (Brodzicki, 2002). We will use the term 'cluster', but still research results could be applied to any of above-mentioned embodiment forms of regional innovation models.

For Ukraine, which has faced serious political and economic challenges over recent years, innovation policy is a promising tool to improve national competitiveness and overcome deep crisis. Agribusiness is a critically important sphere of the Ukrainian national economy as, for example, food products accounted for 38% of national goods exported in 2015 according to UkrStat State Statistics Service (2016). In addition to this, the sector suffers from low efficiency due to obsolete equipment and almost not using the potential of

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related R&D projects (Androshchuk, 2009). Therefore, the results of this research could be extremely valuable for stakeholders in one of the biggest economic spheres of Ukraine. The paper's methodology encompasses a general situation overview in Ukraine, investigation of recent Polish experience in terms of cluster development, country comparisons under EPIC framework, and building a SWOT-analysis matrix. We investigate the potential of implementing in Ukraine foreign experience of cluster development both on macro- (generally in Poland) and microeconomic (on the example of particular organization) levels as well as figure out potential challenges Ukraine may face in the future.

### **Analysis of current innovation in Ukraine**

For emerging countries (Ukraine in particular) it is of vital importance not only to utilize foreign innovations but also to produce them in order to bridge the gap to developed countries (Bazhal et al., 2015). The innovative potential of Ukraine developed when it was part of the USSR, and currently decent quantitative indicators characterize its current level. However, after the collapse of the USSR, systematic economic problems spread into the innovative sphere as well (Poruchnyk, 2004). Androshchuk (2009) in his research figured out that lack of financing (as indicated by 80,1% of surveyed enterprises) was a primary barrier to implementing innovations in Ukraine. In our view the problem is more comprehensive with a core weakness in the national innovation system and commercialization of innovations. Nevertheless, Ukrainian innovative potential is still preserved, which could be proven by active participation of Ukrainian scientists in different international research projects. On the other hand, they are doing it mostly by themselves, so national economy does not receive direct benefits (Androshchuk, 2009). Among possible reasons for low commercialization of innovations is the poor role played by universities in the national innovative process. In practice there are no strong ties between universities and companies in most economic sectors, state research centers and universities, and state research institutes and companies in Ukraine. The Ukrainian innovation model is characterized by several 'double helix' models of university-industry or government-industry cooperation (Romanovskiy, 2012). Fragmentation of innovative systems is not a unique case for Ukraine, as all the countries that were under communism ideology experienced it. In fact, such a system eliminates entrepreneurial (third) role of universities building a decent ecosystem for commercializing new ideas and products (Gryshchenko, 2012). Most research in Ukraine (75%) is performed by State Academy of Science under conditions of extreme underfunding. Only 50% of national universities participate in applied R&D projects in cooperation with business while in small towns the situation is even worse (Yegorov, 2009). More than 75% of university professors are engaged only in the teaching process. Moreover, Ukraine is facing the problem of science aging and brain drain as youth prefers building careers abroad or in the private sector due to extremely low salaries in state-controlled research institutions. State owned and funded universities get low financial support for research, which results in obsolete research facilities (Yegorov and Ranga, 2014). Ukrainian legislative base regarding innovation implementation is still far from perfect: some laws are non-compliable with each other; state budget is oriented towards populist steps of cutting down the budget deficit but not long-term R&D projects. Currently, the point is in how Ukraine can reform its innovative model in order to increase national competitiveness under globalization challenges and *Deep and Comprehensive Free*

*Trade Area* with the EU. Unfortunately, in Ukraine the government innovative strategy for 2010-2020 does not include any systematic reformat but only too-broad recommendations to change the legislative base, make business climate more friendly for investments, and increase the funding of research activities. Moreover, there is no standardized framework which will stimulate and coordinate local innovative initiatives (clusters) development. In the agricultural sphere all the problems of the national innovation model are clearly manifested. Therefore, we will try to look at this problem from another perspective – investigating foreign experience and trying to find lessons Ukrainian policy-makers can learn from it.

As has been previously mentioned, clusters are considered to be a powerful tool of improving enterprise competitiveness and introducing innovative solutions. In Ukraine there are many regional clusters, which were formed mostly on the basis of industrial cooperation for increasing competitiveness all over the country but not as a source of innovation implementation (Gutz, 2015). However, their innovative potential is not used completely. According to Ffowcs-Williams (2015) because of current economic realities successful functioning of clusters is possible only under triple helix ecosystem of business-government-science integration. There are some examples of such new generation clusters in Ukraine - the best clusters were created by the institutes of the National Academy of Sciences of Ukraine with strong technological orientation (Paton Institute for Electric Welding and the Institute of Mono-crystals). They accounted for more than 95% of all Ukrainian innovative production developed and commercialized in 2000–2010 by techno parks (Yegorov and Ranga, 2014). Unfortunately, decent results were shown only until the cancellation of a preferential tax regime in 2005. Today a few clusters are working efficiently in Ukraine (Strogilopulos, 2011). To specify, Kyiv Polytechnic University Science Park and Lviv IT Cluster have shown rapid growth recently but still their activities are mostly oriented on acquiring new cluster members and educational events while innovative research activities remain secondary. In agribusiness the potential of cluster cooperation and triple helix ecosystem is also not utilized properly (Stanasyuk and Olihovska, 2014).

## **Polish national experience in cluster development**

According to Porter (2000) the first clusters were created spontaneously – mostly based on geographical proximity and industrial cooperation. However, today their creation has become a significant part of regional innovation policy all over the world and in EU countries in particular. In Poland, past organizational solutions such as co-operatives, guilds and economic self-governments have lost their effectiveness and become invalid (Mazur, 2015). In the context of innovation commercialization, a relatively new concept of triple helix came to the fore front. According to Leydesdorff and Etzkowitz (1995) the relations of university-industry-government (so called triple helix) evolved from industry-government cooperation due to the increasing role of universities as research institutions. This phenomenon has great potential of overcoming the challenges of the linear innovation model and making the process of implementing and commercializing innovations more efficient. For market economies that were under direct communism impact (e.g. Ukraine and Poland) triple helix clusters are an extremely promising solution for improving the whole national innovation model.

Joining the EU has provided Poland with support programs for innovation development, which turned into a tool of Union policy, enabling such things as funding of

B2B relations, establishing co-operation between entrepreneurs, scientific centers and administration (Plawgo, 2014). Creation of innovative clusters in Poland is a part of programs, projects, and tools under EU *Cohesion Policy 2007-13: National Strategic Reference Framework*, which forms a complex of factors that individually and jointly participate in generation, selection, and diffusion of innovations. Polish innovation models currently are primarily based on the cooperation of three sectors: government, science, education and the business sector (Świadek, 2011). According to Mazur (2015) on the macro level Polish long-term strategy of innovative development is captured in several state regulations and accompanied by local initiatives.

*Cluster Benchmarking in Poland – Edition 2014 General Report* states that entrepreneurs represent 81,3% of cluster members (44,4% are micro, 31,9% small, 17,8% medium and 5,9% large companies). 7,3% of cluster members are support institutions, 7,6% is R&D sector and the remaining entities account for 3,8%. It means that micro and small enterprises, representing together 76,3% of cluster members, are a major driving force of cluster development. Moreover, SMEs have the highest interest in joining clusters and consider them as a decent source of improving competitiveness. More than 51% of cluster enterprises declared that they had conducted R&D activities and 58% of them confirmed implementation of innovative solutions. This is evidence that clusters create a pro-innovative milieu for enterprises and especially small and medium enterprises (SME) (Plawgo, 2014). Several European Commission research projects stated that there is a positive correlation between cluster existence and GDP per capita value depending on cluster strength (Dzierzanowski, 2011). Other researchers could not find direct correlation between national cluster quantity or strength and GDP, but still it was concluded by Figiel and Kuberska (2013), for example, that development of business clusters and supporting cluster initiatives is a decent solution to improve competitiveness of the EU national economies. Grabowska (2015) provided quantitative analysis of existing clusters in Poland trying to explore their impact on the whole economy – it was concluded that Polish clusters are mostly at the beginning of their development, primarily oriented on organizational and marketing innovations, but not technical breakthroughs. In addition to this, lack of facilities in advanced research centers was identified as the most lagging factor in the Polish innovative system. Based on a survey of 21 representatives of triple helix institutional players in Lodz (7 enterprises, 7 universities, 7 administration bodies) Trippner-Hrabi (2014) concluded that businesses still do not understand the mechanics of possible cooperation completely due to different barriers (mostly lack of information and bureaucracy obstacles). In its national or regional innovative activities government should be more active while interacting with business, especially by revealing more about research activities. Cooperation inside the triple helix should be organized in order to stimulate demand for produced innovative goods but not as another way of delivering knowledge, which may not be commercialized on the market.

### **WULS Cluster in Agribusiness as a benchmark for Ukrainian universities**

In our view one of the most important characteristics of the modern innovation system in the EU and Poland in particular is decent conditions for ‘bottom to top’ initiative growth. The government provides framework, funding, and warranties, while researchers and

enterprises act with their projects and initiations. These so-called dotted activities are cumulatively oriented on improving national competitiveness by solving local problems and introducing customized innovative products. One bright example of newly created triple helix cluster initiative in Polish agribusiness is Warsaw University of Life Sciences (WULS) Cluster of Innovation in Agribusiness. The cluster was created on the university's basis according to all canons of triple helix concept. It is completely a university initiative as a step towards promoting its entrepreneurial role and building an efficient innovative ecosystem in one of Europe's best agri-universities (Zelazowska-Przewłoka et. al., 2014). WULS Cluster was developed in order to overcome the barriers for innovations development in agribusiness. To specify, SMEs in Poland do not use their innovational potential, innovation implementation is too expensive, faces transformations in this economy sector, and suffers from institutional challenges (Kusto et. al., 2014).

WULS Cluster of Innovation in Agribusiness has been created as a part of the *Regional Operational Program of Mazovia Region 2007-2013 (Priority I - Creating conditions for development of innovation potential and entrepreneurship in Mazovia, Measure 1.6. Promoting cooperative relations of regional significance)*. The main focus of the cluster is to transfer the knowledge into business – “science to business” (S2B), improve the efficiency of technology and knowledge transfer between participants in the cluster, and consequently increase the innovative potential of the Mazovia region (Szczupska et. al., 2012). Today WULS Cluster of Innovation in Agribusiness is an independent faculty-based institution, aggregating many members, working primarily through the web portal. Creation and development of the cluster was accompanied with active industry research and cooperation activities. Firstly, the general potential of the Mazovia region of Poland as a strong agribusiness player on national scale was identified – it holds leading positions in different spheres of agribusiness among all Polish regions (Analiza sytuacji..., 2013), which defines general vector and relevance of cluster development. In addition to this, the survey of businesses in Mazovia district showed their appreciation of cluster initiatives as a way to reduce production costs, ease access to new technologies, and coordination of marketing activities. On the other hand, industry representatives considered the cooperation with local administration bodies and higher education institutions as not very important. Respondents proved these conclusions by figuring out difficulties while understanding cluster roles and activities as well as lack of cooperation with the scientific environment to be primary barriers of cluster development (Analiza sytuacji..., 2013).

Using dedicated web portals all the members can access two cluster modules. *Food Safety* module consists of an online tool for supply chain management and consulting forum of experts. *Food Professional* stands for online e-learning platform, bank of ideas and working group tools. All of these activities quite often are interconnected but still this is a unique case in Poland where traditional entrepreneurs got easy and fast access to science achievements (Zelazowska-Przewłoka et. al., 2014). Another intriguing initiative of WULS Cluster is *Experts Database* – a collection of business related research materials structured and accessible for members from the cluster web page. However, it is still only at the beginning of its development. It is important to mention that cluster activities are not restricted to an online environment only. During 2012-2014 the cluster initiated several national scale conferences and congresses as another way of connecting science and business as well as promoting the Cluster itself. Finally, different advertising channels (both online and offline) were used as well as regular bulletins prepared and published in order to extend the Cluster and invite new members.

At the beginning, Cluster creation and development was a part of the EU Regional Operation Program, which resulted in sufficient funding. Currently Cluster is primarily focused on internal activities - seeking for funding by applying to other projects. Consequently, the intensity of organized events and advertising campaigns has fallen significantly. In fact, for such Clusters there is a way for self-maintaining by organizing different business activities, however, according to S. Jarzebowski (Head of Cluster) in WULS they do not use that technique currently. There are two possible reasons: first, as long as it is under university authorities (also in funding context) which complicates appropriate procedures, and second, because of being too small currently. Moreover, the Cluster Head put an accent on the fact that funding is the main (if not the only) barrier of development for all innovative clusters in Poland.

### Lessons Ukraine can learn from Poland on explored topic

In order to understand whether Poland is a relevant benchmark for Ukraine in terms of innovation model development it is important to understand key factors that can affect related decisions in both countries. We use the EPIC framework which was primarily developed for assessing the maturity level of countries with respect for their supply chain activities. However, it is possible to adapt this framework to comparing the countries in other contexts and innovation development in particular, which has been done in this research.

Table 1. EPIC factors comparison: Poland and Ukraine

	Variable (data source)	Poland	Ukraine
Economy	GDP (CIA World Factbook)	\$1 003 bln	\$334,3 bln
	GDP Growth Rate, last 3years average (CIA World Factbook)	2,86%	-5,93%
	Population Size (CIA World Factbook)	38,6 mln	44,4 mln
	Investment (Global Innovation Index)	32 (points)	21,4 (points)
Politics	Institutions (Global Innovation Index)	75,3 (points)	52,2 (points)
	Public Sector Performance (World Economic Forum GCI)	3,2 (points)	2,9 (points)
	Intellectual Property Rights (Int. Property Rights Index)	5,9 (points)	3,9 (points)
Infrastructure	ICT (Global Innovation Index)	55,8 (points)	38,2 (points)
	Market Sophistication (Global Innovation Index)	49,0 (points)	43,9 (points)
	Business Sophistication (Global Innovation Index)	35,2 (points)	32,4 (points)
Competences	Human Capital and Research (Global Innovation Index)	37,2 (points)	40,4 (points)
	Knowledge and Technology Output (Global Innovation Index)	28,3 (points)	36,4 (points)
	Creative outputs (Global Innovation Index)	35,4 (points)	31,3 (points)

Source: own work with databases: CIA World Factbook 2014-15, Global Innovation Index 2015, World Economic Forum GCI 2014-15, Intellectual Property Rights Index 2015.

The maturity level of countries is assessed along four dimensions that are represented by the EPIC acronym: Economy, Politics, Infrastructure, and Competence. The majority of the variables in the EPIC structure are assessed using results from in-depth studies conducted

by established organizations (Srinivasan, 2014). Each of these dimensions is evaluated by a number of variables impacting innovation activities. In our view the advantage of the EPIC method is that it provides an opportunity to explore the complex of factors that may have an impact on the investigated object. Table 1 summarizes the comparison of Poland and Ukraine within economy, politics, infrastructure, and competence dimensions.

Table 2. Polish experience of triple helix implementation opportunities for Ukraine SWOT-analysis

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>▪ Preliminary market observations and industry surveys help develop and position the Cluster according to real business needs, but not only theoretical concepts;</li> <li>▪ In clusters scientists benefit more from their research activities not only by receiving salaries but also for participating in potential profit-sharing programs, selling ideas, receiving grants and so on. Moreover, researchers in this case receive money not for ranks or citations number (which of course is also important) but for results of commercialized research work;</li> <li>▪ Embodying innovative Cluster as a web portal is excellent initial step in connecting science and business as it helps to bootstrap in case of insufficient funding and adjust cluster development strategy.</li> </ul>	<ul style="list-style-type: none"> <li>▪ In Poland SMEs are poorly informed regarding Cluster activities and university initiatives, which requires powerful promotional campaigns. In Ukraine the situation is even worse as SMEs are concentrated on surviving but not investing into innovations;</li> <li>▪ Deep economic crisis in Ukraine (both as a continuation of transformation to market economy and a result of partial Russian occupation) set other priorities for state funding and support (e.g. external debt service, currency volatility, pension funds deficit). Now Ukrainian budget simply could not afford any expenditures on long-term projects. To compare, Poland received approximately 0,5 mln. EUR donation from the EU while developing WULS Cluster under one project; however, there were several follow-up development projects.</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>▪ Joining the EU Horizon 2020 program gives opportunity to apply for external funding on initial stages of development under global programs of economic reform;</li> <li>▪ Venture funding could be used as alternative source for sustaining the function of bodies in the future by paying commission from each commercialized project;</li> <li>▪ Clusters could be 'multi branch' as the lessons in agribusiness cluster development are applicable in other economy sectors;</li> <li>▪ As learning platforms Clusters have great potential of improving educational system (with the help of e-learning platforms) and increasing employment.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Local triple helix initiatives need to operate under standardized framework (set of rules) for all players. In this case, inability of Ukrainian government to create appropriate framework may result in collapse of the whole triple helix ecosystem;</li> <li>▪ Corruption and politics lobbying may affect local initiatives negatively primarily in terms of funding distribution;</li> <li>▪ Government inability to develop preferential tax regime for SMEs might thwart Cluster initiatives of implementing innovations because of too high load of innovation costs and tax pressure. As happened in Paton Techno Park after 2005, which resulted almost in complete activity shrinking.</li> <li>▪ In Ukraine the best universities are completely under state control and funding. Consequently, the procedure of starting commercial initiatives by cluster (even for self-maintaining) could be overloaded by bureaucracy.</li> </ul>

Source: own work.

Table 1 confirms the fact that Poland performs significantly better in terms of economy, politics, and infrastructure dimensions. However, Ukraine has great potential for becoming an innovation-driven country, which is proven by the competences dimension. Undoubtedly, it needs global reformation, which in turn will affect the innovation

ecosystem not only in agribusiness but in the whole economy. In this context Polish experience would be incredibly valuable due to the countries' similarities (primarily historical, political, and economical). As part of building a strategy of improving the innovative ecosystem of Ukraine we will use SWOT – analysis in order to observe the opportunities of applying the Polish experience of triple helix development. SWOT is considered to be one of the most popular and flexible analytical tools used in strategy building (Humphrey, 2005). It implies identification of the most important internal factors (strong and weak sides of an object) and matching them with external influence (opportunities and threats). Results of such identification are usually presented in 2x2 matrix – see Table 2 for details.

## Conclusion

In this research we investigated the experience of cluster development in the Polish agribusiness sphere from different angles: in the whole country and on the example of specific institution (WULS Cluster of Innovations). Despite the fact that Poland is not a leading country worldwide in terms of innovations, there are many lessons Ukraine can learn from its experience. We provided an exploration of how Poland is transforming its innovative model into an integrated one and implementing triple helix postulates both on macro- and microeconomic levels. EPIC framework helped us to assess Poland and Ukraine maturity with respect to their innovative ecosystems. It was identified that Ukraine has great potential for innovative development but its economy, politics, and infrastructure needs reforms. Based on the SWOT-analysis performed in this paper it might be concluded that Ukrainian policy-makers at first should pay attention to the creation of a framework of national innovative development, which in turn might push the development of local initiatives. Funding seems to be one of the biggest challenges for cluster development; however, preferential tax regimes, venture funding, and cluster commercial activities should be identified as considerable alternatives. The concept of clusters reveals great potential for increasing competitiveness not only in agribusiness but for the whole SME layer in Ukraine. On the other hand, corruption, political populism, and lobbying are potential threats for most cluster activities. The crucial thing is that mostly external factors might have serious negative impacts on the process of building the triple helix ecosystem in Ukraine as internal drawbacks of Polish model are easily solvable. In this case it is of vital importance to work on this issue comprehensively and develop the framework first.

Triple helix clusters are an excellent chance for Ukraine to make significant breakthroughs in the national system of innovation development, and it is important to apply relevant international experience. However, before application all of the above-mentioned Polish lessons are subject for future investigation.

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