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LOCAL ASPECTS OF THE TRIPLE HELIX MODEL ON THE EXAMPLE OF BIAŁYSTOK

Summary

The cooperation of the three sectors included in the Triple Helix (TH), i.e. science, business and public administration is carried out in varied ways. The course of the relationship is not only affected by the sectors themselves but also by factors specific to the environment in which they operate.

The article focuses on the local aspects of the TH model – actors who create it and give it a specific, individualized dimension. At the beginning of deliberations, the authors hypothesized that the formation of Białystok Science and Technology Park contributed to the intensification of cooperation between the three sectors in the city of Białystok and the incubation of new innovative enterprises. The aim of the study was to determine the local TH model parameters in the City of Białystok and evaluate the potential of individual actors.

In Białystok, public administration has highest potential within the local TH model. Due to the relatively high degree of integration and concentration of authority in the city it is much easier to carry out long-term innovation policy. The basic problem of business and science turns out to be a low degree of concentration, which hinders the diffusion of knowledge and reduces competitiveness.

In Białystok LGU is the moderator of cooperation between the three sectors – there is a etatistic model. The current local government intervention is supposed to lead to the independence of the two other spheres, through their innovation and increase in competitiveness.

Key words: Triple Helix, public administration, etatistic model, innovation, local development, Poland

1. Introduction

The Triple Helix model was built relatively recently, about three decades ago. Vestigial elements (fragments of old concepts and approaches to innovation and the coexistence of different spheres of economic reality) used in the model created by H. Etzkowitz and L. Leydesdorff should be sought much earlier, e.g. in the works of A. Marshall [1920] or J. A. Schumpeter [1942], that is, in the first half of the twentieth century. However, this is only the work of C. U. Lowe [1982], J. Sabato [1975] and M. Mackenzi [1982] along with the economic changes in the world (associated inter alia with the transition of many developed countries from economies based on industry to economies

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in which the key role is played by knowledge) that triggered the need to examine, define and specify the new ways of reality functioning.

The Triple Helix model includes both institutional factors and infrastructure that enable the development and uptake of innovations. At the local level it leads, *inter alia*, to the improvement in the dynamics of urban development. The relationship between factors and actors is subject to change. From the two entities relationship (science and business e.g. research center – company) it transforms into a relationship of three (with public administration). Today, public authority is becoming an important element of the local innovation system.

So far, the Triple Helix model (TH) in Poland has been discussed primarily at the national level, but progressive decentralization, more and more decision-making autonomy of local government units (LGUs) is increasingly making it advisable to analyze the cooperation between science, business and public administration in particular urban centers [electronic document, access mode: <https://www.kul.pl/files/42/Decentralizacja.pdf>, date of access (4/12/2015)]. In the twenty-first century power (understood as a real opportunity to decide) is transferred to ever lower levels (authorities) of public administration. This leads to the formation and development of a diverse and highly individualized varieties of model of cooperation between the three sectors [Rodrigues, Melo, 2013, pp. 1675-1687].

Innovation has become a key factor in determining the development and creation of a knowledge-based economy, a competitive economy. The most effective way to create an innovative economy seems to be the effective use of scientific achievements by businesses [Ciborowski, 2009, pp. 279-280]. Local innovation is increasingly being driven by local authorities. The role of government is not limited to mediation between science and business, but also relates to the development of innovation policy, provision of tools and instruments for supporting innovation [Palma, Peña Aguilar, Valencia Pérez, Madrid, 2011]. LGUs take action to improve the pace of integration of business and science as well as to accelerate the flow of knowledge between them.

The Triple Helix model describes the innovation as a result of cooperation between the three sectors. It manifests itself as a set of specific, flexible and universal connections between enterprises, research institutions and the public sector [Etzkowitz, Ranga, 2010, p. 2]. At the beginning of deliberations the authors hypothesized that the formation of Białystok Science and Technology Park contributed to the intensification of cooperation between the three sectors in the city of Białystok and the incubation of new innovative enterprises. This article aims to identify and evaluate current activities of different actors, and above all, place them on the local economic scene and determine their relationships. The authors will carry out inference on the basis of available local statistics, which will determine the specificity of the Triple Helix model in the city of Białystok. During the study, the authors conducted an *ex post* analysis of the activity and development pace of the three sectors as well as presented their current structure according to their social, legal and inner potential.

The conducted study had mainly cognitive objectives. It made it possible to deepen knowledge of the basics of shaping and developing a network of cooperation within the Triple Helix in Białystok. It should be noted that the proper use of the Triple Helix,

e.g. through careful coordination of cooperation, can enable synergy which ensures the development of innovation and creates a knowledge-based economy.

Searching for the causes of increased interest in innovation, growing global competition – not only between parties operating on the market, but between whole countries (markets) – should be pointed out [*Nierówności społeczne...*, 2004, p. 255]. The growth of India and China has led to economic weakening of competitive positions of Europe and the US. This has forced the latter to take action that will compete with new players on the global level. Innovation is competitiveness and the possibility of its creation an advantage. However, it is not easy to achieve and requires the integration of work and activities of different interest groups.

2. Introduction to the subject – Triple Helix at the local level

The growing importance of science and knowledge in the twentieth century, their use not only to describe reality but also in terms of the possibility of creation of an environment has influenced more and more publications in which the need for more intensive cooperation between the three sectors is expressed [Etzkowitz, Leydesdorff, 1995, pp. 14-19]. The cooperation of the three sectors in this article shall be understood as taking action towards a common goal, based on the identification with this objective, trust and acting in the interests of all participants [Czarniawski, 2002, p. 11]. Cooperation around the exchange and development of knowledge, leading to a strengthening of innovation contributes to the enhancement of local capacity and socio-economic development.

An additional element responsible for changing the prism of perception of this cooperation are constantly growing demands on the competitiveness of the players prospering on globalizing and integrating market [Castells, 2007, pp. 179-180]. As a result, concentration of business activities requires specific knowledge. This can be provided by greater urban centers, which are quasi-substitute for compact areas and whose specifics is similar to former polis [Mogens, 2011]. Located within their spatial and administrative borders, resources of knowledge – science (understood as entities connected with education, research, development, e.g. universities, and further: scientists, students), business (of all sizes and areas of activity) are being integrated and can be guided by local authorities. The degree of interaction of each sphere is different in each individual case, and depends on many factors, including inter alia:

- the size of the center and the degree of concentration of the actors,
- history, traditions e.g. in entrepreneurship,
- the level of development of different spheres/actors,
- their past and current activity.

Larger urban centers (e.g. with more than 100,000 residents; in Poland – voivodeship capitals), due to the currently observed trends (population movements in their direction) are steadily increasing the potential of knowledge [*Koncepcje regionalnej organizacji kraju*, 1991, p. 156]. As a result, the role of scientific institutions in big cities is growing, and human capital, directly contributing to increasing innovation, is becoming a key source of

competitive advantage [Pasterz, 2010, p. 80]. It should be noted, however, that long-term demographic trends are unfavorable for a large part of these centers due to the depopulation of almost all Polish regions [Szukalski, 2014, pp. 2-3].

Voivodeship capitals, where some spheres have developed more intensively due to historical events, formed a local model of cooperation in which one of the spheres is dominant. The academic sphere strongly influences the relationship between the actors in Warsaw, Krakow, Wroclaw and Poznan. As a consequence of the good will of former rulers, patrons of science and art, and then the treatment of these centers as places of particular cultural and scientific value (e.g. during the partitions, the interwar period and after World War II), the scientific sphere had the opportunity to secure its strong local position. The scientific sector in these cities developed a strong negotiating position and an opportunity to interact with the other actors. The potential of science in these centers can influence the policy of the local government, affect the business or even replace it in some areas (e.g. by supporting entrepreneurship among lecturers and students, conducting implementation research, forming clusters, commercializing the results of in their own companies' research).

Business plays a key role in some Polish cities, such as Katowice (and cities located around – Upper Silesia conurbation), Lodz, Plock, or in certain historical periods – Warsaw. The enterprise there supports and moderates the educational offer, e.g. by matching faculties to the current needs of the labor market, indicating the field for improvements in talks with municipalities and even developing and promoting innovation (creating research institutes, funding education, promoting their region, creating better conditions for workers and their families, integrating collaboration with other sectors).

Since the political changes in Poland (1989) and changes resulting from the Act of 1998 on a three-level administrative division of the state [Dz. U. 1998 nr 96 poz. 603] 18 major urban centers (voivodeship capitals) have had special conditions for the further operation. With representatives of the central level authorities positioned in these centres, modification of the existing system has allowed to strengthen their position. Their authorities gained access to larger funds and real opportunities to influence politics not only in their region, but also at the national level.

After 1989 companies faced a difficult task to compete in an environment where the market mechanism has become a regulator. This required the adoption of new, not yet used forms and strategies. Businesses and society relatively quickly adapted to the new rules of the market game. At the same time, local governments passed the slow process of transformation. Strengthening the role of the largest Polish cities after 1998 meant that they became strong enough to shape development (locally and regionally). Private sphere with a relatively rapid inflow of foreign capital, involvement of multinational corporations as well as higher and higher concentration in many markets needed strong partners – the authorities having a power of decision-making. Administrative reform of 1998 has provided these strong partners as local governments in voivodeship capitals.

Lack of urban policy and shortage of experience in the field of cooperation between the actors of the local community resulted in the city's attempts to assist entrepreneurs during their competition in the global market. The issues of innovation have been

neglected for a relatively long time at the local level – in the cities. National and regional policy have also taken up the issues relatively late. The established guidelines were more aspirations and visions than a specific plan and timetable for action to be taken. In 2000 Regional Innovation Strategies emerged as a result of the work of the regional authorities [Klepka, 2005].

The growing awareness of the importance of favorable geographical conditions caused that cities such as Poznan, Krakow and Wroclaw have fostered the creation of innovative institutions – technology parks. In subsequent years, the need for attention to the development of economic potential in the individual local government units has significantly increased.

Competition has extended from companies to local governments as well. Immediately after the Polish accession to the EU (May 2004) it turned out that one of the core strengths which enable the development of LGUs is the innovative potential of the city. Despite the undeniable advantages of large local governments, those smaller ones also began searching for the possibility of creating their own innovative areas based on local advantage.

Changes in the approach to cities could also be found in literature. Attention has increasingly focused on resources – information, knowledge, innovation. The new concepts of “creative city”, “innovative city”, and “city of learning” have spread. Topics covered in literature have influenced the formulation of urban policies, aimed at improving the potential of innovation and creativity in the entities operating in their region [Silka, 2012, p. 11].

Cooperation between science, business and public sector is different in each urban center. The elements responsible for the blending of approaches have varied bases. However, in the local government authorities’ awareness of the importance of this kind of integration measures, which should lead to the development of all three spheres and ultimately the whole local community, is increasing.

Consequently, it is worth analyzing such a cooperation at the local level. Bialystok is an example of the integration of the three sectors in which the leading role is played by the local authority (the etatistic model [Etzkowitz, Leydesdorff, pp. 110-112]).

3. Bialystok – the characteristics of the center

Bialystok has currently approx. 300 thousand inhabitants [electronic document, access mode: <http://stat.gov.pl/statystyka-regionalna/rankingi-statystyczne/miastanajwieksze-pod-wzglem-liczby-ludnosci/>, date of access: 12.04.2015]. Since 1955 the population has increased eightfold. An especially rapid population growth occurred in the years 1980-1990 (over 20% population growth) [electronic document, access mode: <http://bialystok.stat.gov.pl/>, date of access: 23.03.2015]. Bialystok currently occupies an area of approx. 102 km², yet the impact of its potential is much greater.

As a result of the concentration of power, Bialystok has gained importance as the capital of one of the sixteen voivodeships (since 1999). Placing the government administration handling an area of over 20 thousand km² inhabited by approx.

1.2 million people in Białystok has made the city the center of decision-making and development of Podlasie [electronic document, access mode: stat.gov.pl/cps/rde/xbcr/gus/L_powierzchnia_ludnosc_teryt_2012.pdf, date of access: 14.01.2015]. The core area determined by the administrative boundaries of Białystok has become an attractive place for both residents and local government units within and outside of the region.

For the population living in neighboring municipalities, the city is the direction of daily commuting to work, education, culture and entertainment places. Białystok serves as the administrative, economic, scientific and cultural center of the region. As a result of ever closer integration with the municipalities neighboring Białystok, Białystok Functional Area has been created (BOF). It consists of: the capital of Podlasie – city of Białystok and 9 municipalities, including urban-rural municipalities: Choroszcz, Czarna Białostocka, Lapy, Supraśl, Wasilków, Zabłudów and rural municipalities: Dobrzyniewo Duże, Juchnowiec Koscielny, Turossz Koscielna. All municipalities forming BOF belong to the district of Białystok and are located in the central part of the region of Podlasie. It is therefore a natural zone of influence of entities from three spheres: science, business and public authorities. Białystok Functional Area is bordered by the districts of: Sokółka, Monki, Wysokie Mazowieckie, Bielsk and Hajnowka. BOF surface is 1 728 km² and is inhabited by a total of 411 531 people [electronic document, access mode: <http://bof.org.pl/onas.html>, date of access: 22.03.2015]. The cooperation within the region and with neighboring local governments leads to synergy which also influences business and the sphere of science. The increasing concentration of population in this area encourages entrepreneurship and leads to increased demand for knowledge [*The Oxford Handbook of Innovation*, 2006, pp. 297-317].

Białystok does not have such a long tradition and history as cities such as Kraków or Warsaw, making it difficult to identify previous historical advantages of each sector. In its early days it was only a point on trade routes. At the end of the seventeenth century Białystok received city rights. Still, its role centered around the trade routes and residence of the Branicki family. It was not until the nineteenth century that a long-awaited change was brought – development of the industry (due to the annexation boundaries and restrictions regarding trade between the spheres of influence of the great powers) made Białystok gain importance. Białystok in the years 1807-1915 became a part of the Russian Empire and until the mid-twentieth century did not play a larger political and economic role in this part of Europe. It was the re-location of the city within the Polish People's Republic (PRL), then the placement of the provincial administration here in 1975 and further increase in its importance in the new administrative division in 1998 that led to a dramatic increase in the value of this city located in the eastern part of Poland.

Entrepreneurship in Białystok was neglected during the partitions of Poland and the occupation (1807-1915), then destroyed during the Second World War (75% of the city destroyed) and limited and weakened in PRL (1952-1989). As a result, private business has only flourished in Białystok for 25 years. Unfortunately, prior periods did not develop adequate tradition which forces Białystok to work to enhance entrepreneurship [electronic document, access mode: <http://www.regiopraca.pl/portal/rynek-pracy/wiadomosci/najbardziej-przedsiębiorczy-sa-w-warszawie-najmniej-w-białymstoku-bydgoszczy->, date of access: 22.03.2015]. The private sector requires an

explicit support to be able to provide the further development of this area. Apart from a brief textile episode, Bialystok has no industrial tradition.

In 2014 in Bialystok the ratio of businesses registered in REGON to the population was only 11.12% (e.g. in Gdansk – 15.44%, Krakow – 16.67%, Olsztyn – 13.00% or Warsaw – 22.15%). This indicator highlights the weakness of business and low level of entrepreneurship among the inhabitants of Bialystok. Besides, now in Bialystok entrepreneurship is undergoing deconcentration (reducing number of large and medium-sized enterprises and growing number of the smallest). In Bialystok, in 2009-2014 we observed a 12% increase in the number of economic entities [electronic document, access mode: <http://bip.stat.gov.pl>, date of access: 11.03.2015].

Current sector of private enterprise in Bialystok has been activated as a result of the concentration of power in the local government. In this way, the administration of the twentieth century was an element that attracted both people and entrepreneurship to Bialystok.

Bialystok's tradition as an academic center is even shorter. Despite rapid development, it is not able to compete with Warsaw, Wroclaw or Krakow universities. In spite of the existence of three relatively large (for the eastern part of Poland) universities (Medical University of Bialystok, Bialystok University of Technology, University of Bialystok), the city cannot boast of equally long tradition in research or regionally and locally integrated staff.

One of the basic criteria for assessing the “academic character of the city” is the number of students in a given center (the more students, the larger impact they have on the local community). They influence, among others, the local rental housing market, they are the basis for the existence of a number of milk bars, restaurants, pubs, clubs and discos, they finance local cultural life. They also affect labor supply, which is of great importance for the development of enterprises.

Currently, Bialystok has approx. 45 thousand students and 19 universities [electronic document, access mode: <http://www.bialystok.pl/824-ciekawostki/default.aspx>, date of access: 25.03.2015]. Changing the positions of the universities in Bialystok (in the country and locally – in relation to business partners and government) requires time (e.g. University of Bialystok has formally existed since 1997) and the emergence of a tradition that will bond and determine the competitive position of these academic centers in Poland. Comparing the number of students to the number of inhabitants, Bialystok obtained ratio of 15%, which can be considered as average in the country. University towns such as Krakow, Wroclaw or Poznan (classic TH model) present the ratio of respectively 29%, 25%, and 24% [electronic document, access mode: http://wiadomosci.dlastudenta.pl/arttykul/Najwieksze_miasta_studenckie_w_Polsce,105019.html, date of access: 21.03.2015]. Thus, their scientific potential is much higher, and it (if it remains in the center for a long time) determines the competitiveness of a given city.

In that manner, the public sector has gained an advantage over the other actors in Bialystok. Especially the twentieth century has restricted the development of the private sector, and the last twenty-fifth anniversary was primarily a period of expansion of the scientific sector – e.g. due to the ICT revolution (widespread Internet access). Despite favorable conditions for the other two players it is the government that has the highest

potential (financial, legal, moral, etc.), mainly due to the concentration of power. For this reason, local authorities have taken on the task of creating further development of Białystok.

4. Innovation at local (regional) level – Białystok

Despite numerous difficulties and much worse initial competitive position than the cities in western Poland, Białystok has been intensively developing in the last twenty five years. Additional acceleration of the development has occurred in the last decade.

This was due to both endogenous factors (growing population, the accumulation of human capital from the whole voivodeship area and partly from the eastern border of the country, the development of universities, intensification of local entrepreneurship and the increasing internationalization of business, etc.) and exogenous (establishment of Białystok as a capital of one of the sixteen voivodeships, increasing its political role, the growing importance of territorial cohesion which more and more resources from the national budget, the accession to the European Union which resulted in financing of many projects to accelerate the development, etc.). The use of the emerging opportunity lay in the hands of innovative entities (including ICT) operating in the agglomeration of Białystok. This would not have been possible without the support of the public administration.

In Białystok, processes of business deconcentration lead to business defragmentation. This process encourages to trace the innovation potential with particular emphasis on this aspect.

TABLE 1.
Summary of ICT entities and businesses by REGON in Białystok

Year	Number of ICT entities (sections 26,61,62 by PKD 2007)	Number of businesses by REGON	Ratio of the number of entities of ICT to economic operators in total
2009	457	30059	1.52%
2010	512	31264	1.64%
2011	556	31339	1.77%
2012	596	32410	1.84%
2013	675	33085	2.04%
2014	761	33735	2.26%

Source: Own study on the basis of statistic data from BDL and GUS.

The above table (table 1) presents operators highlighting the sections which are considered particularly innovative. The number of entities in the advanced sectors is steadily increasing. The growth dynamics in Białystok in the analyzed period amounted to approx. 166%. The share of ICT in relation to the total number of enterprises in

Białystok is almost 2.3% (not a high score compared to other voivodeship capitals). Thus, the development of the private sector towards innovation sectors has been relatively small.

Clusters are another form of concentration, which often connects entrepreneurs with science and local governments. The more numerous they are, the more intense the cooperation between sectors. Due to the area of activity and geographic location of cluster members, the measurement included the entire voivodeship. Thus, according to the Polish Agency for Enterprise Development in Podlaskie there are 9 clusters. In the case of Podlasie they associate a total of 527 entities, including 264 enterprises [electronic document, access mode: <http://www.pi.gov.pl/PARP/data/klastry/>, date of access: 01.04.2015]. Cluster initiatives in Podlaskie focus very varied entities which positively affects innovation of undertaken projects. The local government actively supports efforts towards the creation and functioning of clusters.

TABLE 2.
Expenditure on R&D per capita and per employee in Podlaskie Voivodeship

Year	Expenditure on R&D per capita (PLN)	Expenditure on R&D per R&D employee (PLN)
2009	55.6	26 700
2010	86.2	42 600
2011	116.1	54 700
2012	115.8	55 500
2013	171.1	73 700

Source: Own study on the basis of statistic data from BDL and GUS.

The above table (Table 2) presents the ratio of expenditure on R&D per one citizen and one R&D employee. In assessing the innovation of economic activities in the area, it is worthwhile to pay attention to these indicators, because they are evidence of the local shape of the business sector.

The ratio of expenditure on R&D per employee is of particular importance. In the last five years, it has significantly improved in Podlaskie Voivodeship. The dynamics of expenditures in subsequent years in eastern Poland is much higher than in the western part of the country. Yet there is still a relatively large difference between the expenditures (as an absolute value) on R&D in the eastern voivodeships and the western. The support given to private companies by the Białystok local government is getting higher and higher every year, which enables them to increase the competitiveness and innovation [*own sources of the Municipal Office in Białystok*].

The private sector is relatively weak and requires support from local authorities. This support is widened every year. In addition to the previously used tax exemptions and credits, support of initiatives to increase competitiveness, innovation and entrepreneurship concentration, construction of infrastructure and promotion of Podlasie enterprises, the local government decided to create a body that in the following years can contribute to the integration of the scientific community and entrepreneurs. It is the Białystok Science and Technology Park (BPNT), which together with the Białystok Sub-zone of the Suwalki

Special Economic Zone (Białystok Sub-zone SSEZ) forms an area friendly to industry and innovation in Białystok.

BPNT will not replace the activities of universities. The aim of the park is to supplement the offer of research units located throughout Podlasie and Białystok, as well as to support actions to strengthen cooperation between science and business. BPNT is a product that combines elements of research and practice which ultimately contributes to the growth of innovative companies operating in the local market.

The potential of Białystok universities is growing steadily, but still they are not able to compete alone with the leading scientific centers in the central or western part of Poland. The problem is the low level of concentration, as shown in the table below (Table 3). The three largest universities in Białystok in 2013 educated a total of a little over 30 thousand students, while their counterparts in Warsaw – 89 thousand students, Lublin – 39.5 thousand students. In Olsztyn there is only one big university (27.5 thousand students). Hence Białystok universities' cooperation is essential to start competing with larger centers. Support from the local government and entities such as science and technology parks, research institutes, and foundations may be crucial. Only in this way, as a united potential, Podlasie universities can strengthen their positions in the country and abroad. BPNT wants to support cooperation between universities and enlarge their innovative potential.

TABLE 3.

The number of students of selected universities in 2013

Name of university (3 categories) and number of students	City					
	Białystok	Warsaw	Olsztyn	Lublin	Poznan	Wrocław
Name of university	University of Białystok	University of Warsaw	University of Warmia and Mazury in Olsztyn	Maria Curie-Skłodowska University in Lublin	Adam Mickiewicz University in Poznan	University of Wrocław
Number of students	13411	46125	27470	21794	40633	26239
Name of university	Medical University of Białystok	Medical University of Warsaw	–	Medical University of Lublin	Poznan University of Medical Sciences	Wrocław Medical University
Number of students	4453	8743	–	7051	7089	5349
Name of university	Białystok Technical University	Warsaw University of Technology	–	Lublin University of Technology	Poznan University of Technology	Wrocław University of Technology
Number of students	12269	34135	–	10640	11320	34428

Source: Own study on the basis of: [Główny Urząd Statystyczny, *Szkoły wyższe...*].

In recent years, Białystok universities have undergone numerous significant changes. Currently, their involvement in the creation of the economic sphere is getting larger. They carry out numerous programs whose goals are inter alia to: facilitate the transfer of human capital from universities to the Podlasie labor market, increase the degree of adaptation of graduates to meet the needs of Podlasie enterprises, improve the quality of education, promote research and development, etc. Białystok universities are involved in plentiful projects and competitions, as a result of which they are becoming more recognizable in Poland and in the world, and in the future it could attract more human capital to Białystok.

In addition, Białystok universities are participating in the development of human capital at all levels of education, for example University of Białystok leads “Children's University”, and Białystok Technical University patronizes several classes in secondary schools, which leads to an increase in the level of entrepreneurship and improve the quality of education. In Białystok, there also operate Academic Incubators of Entrepreneurship, for example one is located at the Faculty of Economics and Management at the University of Białystok. They support the establishment and development of business, which measurably affects the business independence of students.

Local Government, with its potential increased as a result of acquisition of EU funds as well as relatively high political force (11th largest city in terms of population in Poland [electronic document, access mode: <http://stat.gov.pl/statystyka-regionalna/rankingi-statystyczne/miasta-najwieksze-pod-wzgledem-liczby-ludnosci/>, date of access: 12.04.2015], one of the 18 voivodeship capitals) concentrated in Białystok, could take steps to speed up the process leading to the growth of innovation in the region.

In addition to the indirect activities such as the promotion of business initiatives, concentration of Białystok universities, organizing business events that allow for networking business (e.g. Eastern Economic Congress held in 2014 in Białystok) [electronic document, access mode: <http://www.wschodnikongres.eu/pl/>, date of access: 12.04.2015], promoting business and universities in Poland and in the world, [electronic document, access mode: <http://www.student.lex.pl/czytaj/-/article/bialostockie-uczelnie-podpisaly-porozumienie-z-miastem>, date of access: 12.04.2015] etc., Białystok authorities have taken on the role of both local TH integrator and motivator for further development activities. In order to achieve that goal, the EU project created Białystok Science and Technology Park (two buildings with equipment: Technological Incubator and Technology Center of 13000 m² in total) and provided 23 ha of investment areas with utility infrastructure intended for entrepreneurs engaged in innovation activities [*own sources of the Municipal Office in Białystok*]. Project to establish BPNT is in progress (2008-2015), with its estimated value of over 169 million PLN (including ERDF funding – 126 million PLN). It should be noted, however, that BPNT is already functioning and as a result of its operation only in 2014 companies received support in the form of the de mini mis of over 898 thousand PLN [*own sources of the Municipal Office in Białystok*].

BPNT is a form of direct support for innovation, creation of innovative ideas and support for entrepreneurship. Thus, it complements the actions of universities located in this part of Poland and adds to innovative value of the area.

Technology Incubator (ITBPNT) is a place for people starting their own businesses (0-3 years on the market). ITBPNT's aim is to create conditions for development by: providing office space at preferential prices, access to contacts, access to modern infrastructure and marketing support, training and consulting, etc. An important aspect is the ability to use the experience of other companies operating within the ITBPNT or research institutions. Currently, there are 30 entities within ITBPNT that operate using modern technologies. BPNT locators represent mainly ICT, automation and robotics, electronics, e-marketing, mobile applications, e-commerce, telecommunications and computer graphics.

The second area of support is Technology Center (CTBPNT), which provides contact between science and business. It consists of: Molecular Imaging Laboratory (operator: SPV Medical University of Białystok), Electromagnetic Compatibility Laboratory, Computer Graphics Laboratory, Biomedical Profile Laboratory, Physicochemical Laboratory [*BPNT own sources*].

By providing infrastructure located in the Technology Center, BPNT supports the commercialization of scientific research results and initiates the transfer of technology. The Center is a place where businesses with innovative activities based on modern solutions in their industries can operate. Currently, locators of Technology Center include ChM LLC – the largest Polish manufacturer of medical implants and instruments for orthopedics and traumatology and SAPLING LLC dedicated to developing technologies applicable in the field of wastewater treatment and sludge economy. These companies are a source of knowledge and potential partners for young entrepreneurs from Technology Incubator [*BPNT own sources*].

In addition to the above items, within the project entitled: “Innovation, collaboration and academic entrepreneurship accelerator BPNT” BPNT created two spaces: Transferring Space and Centroom. The first is housed in the Technology Incubator. It is a space where students and researchers can carry out projects for companies. It is a formula intended to encourage the commercialization of research and enable benefits for business by getting access to knowledge and new solutions, for students and university graduates by the opportunity to gain experience, develop their interests and use their knowledge, and for the scientific community by the opportunity to work on real business problems.

The second element of the project is Centroom. It is a coworking space located in the center of Białystok (in contrast to other elements BPNT, which are placed near Białystok Sub-zone – the industrial part of the city). The goal of Centroom is to support young entrepreneurs and people who want to start their own business by offering them favorable conditions for creative work. Centroom is a unique space, where for very little money you can rent a desk for hours, work on the project, take part in workshops, trainings and meetings to raise the competences of young entrepreneurs.

The second element of direct interference of local government units in the regional economy is the creation of Białystok Sub-zone SSEZ in 2008. As a part of the project

entitled: "Preparation of investment areas for Bialystok subzone of Suwalki Special Economic Zone through construction of infrastructure and road surfaces" the necessary technical infrastructure (water supply, sewage system, rainwater, teletechnical) and surface of sub-zone streets has been built. The center is located in the same part of town as BPNT which makes this place a particularly friendly area for entrepreneurship and innovation. The total investment has exceeded PLN50 m, including funding from the ROP 2007-2013 – PLN44 m [*own sources of the Municipal Office in Bialystok*].

During the period 2009-2014, the 9 enterprises invested in Bialystok Sub-zone SSEZ (including the manufacturer of modern systems of heating and water, a manufacturer of electric water heaters, heat pumps, solar collectors, a manufacturer of plastic enclosures for electric tools and household appliances, industrial machinery manufacturers and printing industry). It is worth noting that as a result of the investment of local government units in the Bialystok Sub-zone SEZ, capital expenditures by entrepreneurs (at the end of 2014) totaled nearly 290 million PLN and created 819 new jobs. Ultimately, the declared value of the investment is expected to reach PLN 527 m which is ten times the expenditure incurred by the local government.

An important advantage of investing in SSEZ is the possibility of obtaining state aid for the costs incurred for investments or income tax relief e.g. for creating new jobs. The value of the public aid provided by the City of Bialystok to entrepreneurs in 2014 amounted to more than PLN 38.5 m.

Bialystok Science and Technology Park and Bialystok Sub-zone of Suwalki Special Economic Zone are just two examples of local governments' direct impact on the functioning of the Triple Helix model in local conditions. In this way, Bialystok creates its present form, generating the potential for the next decades.

5. Conclusion

The character of the study was preliminary and informative. The holistic model research will be conducted as a part of a research grant, thus the spatial and methodological scope of the study was limited. As a result of focusing on one urban centre, the insufficiency of statistic data proved not problematic. During future extended research, the statistic and comparative measures of urban functional centres will be conducted, including research questionnaires for the three spheres.

In the analysis by the European Commission, it has already been recognized that "local and regional level activities are actually the best plane (...)", which enables contacting entrepreneurs and providing them with "...the necessary assistance in the field of external qualifications they need" [*Annual Innovation Policy*, 2009, p. 45]. It is the local level, due to the proximity of individual spheres and actors of the market game, that turns out to be the best place to boost innovation and create a knowledge economy.

In the case of Bialystok the local authorities have the greatest impact on the processes of innovation growth in urban functional area through support for business and science. The government has the tools to pursue long-term policies, which can contribute to increasing innovation of the city and thereby improving the economic situation

[Truskolaski, 2013, pp. 21-34]. For the last several years, support for cooperation between science and business has consisted mainly of indirect actions, and for about 5 years, local government authorities have been involved directly, creating conditions for the development of innovative activities. Local government has begun to create and through the right companies has become responsible for knowledge transfer and commercialization of research results.

As a result of the analysis, it can be concluded that the local government is currently a moderator of cooperation between the three sectors. It encourages other sectors to establish relationships and takes some actions that theoretically belong to the other two sectors. It should be emphasized that the role of the government is not limited to mediation between science and business, but also should concern innovative policy and share tools and instruments for supporting innovation [Palma, Peña Aguilar, Valencia Pérez, Lamadrid, 2011].

The weakest actor in the conditions of Białystok turns out to be the private sector. Its significant fragmentation and still relatively low, though constantly improving, innovation means that it is not able to moderate co-operation between the actors at the local TH level sufficiently. The relatively low level of entrepreneurship among the population, lower competitiveness of the private sector in Białystok compared to others (mainly western) voivodeships means that the private sector is not the engine of Białystok's regional development. Occurring profile changes (increase primarily in the number of sole proprietorships) make it difficult for this sector to influence the development of the region, develop human capital, participate in curriculum development or co-create a united front in negotiations with local governments. The interest of the private sector in developing business environment and commitment to the development of human capital in the last few years has been continuously growing.

Universities have a relatively strong position locally, they participate in the creation of innovative potential and development of the research environment, but domestically their impact is still relatively weak, mainly due to the much smaller size (potential) than universities located west of the Vistula. So it is recommended to further concentration of universities, as it can provide them with the potential and diversity of knowledge, skills and competencies necessary to compete with other research centers. Nevertheless, universities cannot be denied their resilience and dynamism when it comes to development (continuous improvement of teaching and research personnel, research facilities, grant programs and training). If the trend towards cooperation and concentration is maintained, in Białystok there will be created a campus that will strongly influence not only the development of the metropolitan area but also of the entire voivodeship.

In every local innovative TH system, people are crucial [Etzkowitz, Dzisah, Ranga, Zhou, 2007, p. 15]. Knowledge and skills – potential accumulated in the society – decides on innovation and the further competitiveness of the area. Białystok is in a particularly favorable position, because each year it educates nearly 45 thousand people, which is an equivalent to 1/8 of the population of this city. It is worth noting that students form a group which successively supplies the labor market. Therefore, it should be carefully watched in order to pick out talents that may determine the competitiveness of the local community. Further development depends on this group and through the

cooperation of the three sectors conditions should be created that will encourage these people to live in Białystok. Both the government and universities should pay attention to demographic trends and already prepare for a drop in supply of human capital. Developing a strategy for providing such changes may protect Białystok against future problems.

The Triple Helix model is not only intended to promote the continuous learning and innovation, but also sharing knowledge and networking with individuals, organizations, institutions in order to achieve mutual benefit. This synergy of science, business and local government is to ultimately lead to the development that ensures the endurance of the communities.

In Białystok the local authorities, understanding the meaning of the implementation of the relevant instruments to create innovation, have assumed the role of the leader. In addition to the indirect actions for the integration of science and business, directly affecting the shape of TH, e.g. creating BPNT or extending Białystok Sub-zone SSEZ. In this way, in the TH statist formula, with the intervention of local authorities entrepreneurship, scientific sector and private sector are supported. Over time, this should lead to a higher level of concentration of these players, which will translate into increasing the importance of science and business and withdraw from direct intervention by the public sector.

Local TH model is aimed to serve the creation of innovation through cooperation of the three spheres (actors): science, business and local authorities (public administration). These activities are undertaken to implement the fundamental objectives of the audience – the public [Jasinski, 2004, pp. 7-8]. The main actor on the Białystok stage of innovation is now the government that encourages the other actors (science and business) for greater boldness and activity.

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