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NETWORKS, STAKEHOLDERS AND ENTREPRENEURIAL ECOSYSYSTEMS IN CURRENT POLISH ECONOMY

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PREFACE

This book is dedicated to widely understood entrepreneurship and financial system in different polish ecosystems. In particular, there is described influence of supporting entrepreneurship to investment development in Walbrzych agglomerations communes with the results of questionnaires for varied groups of inhabitants, entrepreneurs and territorial self-governments. There is also presented analysis of relations within academic support of entrepreneurship ecosystem, based on interview outcomes. Additionally there are presented, research of academic business incubators impact on infrastructure level of centers supporting development and general overview how nowadays entrepreneurship of Poles has changed. Last part of the book is an attempt to explain the potential influence of new financing system for public healthcare providers including conclusions and recommendations after first periods of its functioning.

Chapter **1**

EFFECT OF ENTREPRENEURSHIP OF POLES ON ECONOMIC DEVELOPMENT IN THE 21ST CENTURY

Stanisław Kaczyński [1)]

1. Introduction

The 21st century is a time in which it is increasingly difficult to develop enterprises, to build a strategic advantage in a competitive market. An economically strong enterprise is also a strong economy of a given country. They are organisms with each other very closely related, especially in economic terms, but not only. Currently, the entrepreneur is required to have an open mind, full of unconventional ideas with the ability to solve unusual situations, able to be creative and enterprising in action. That is why the entrepreneurship of Poles has a huge impact on the development of our entire economy. We must still chase Europe economically. Our political system after the Second World War meant that until 1989 we were developing at a different pace than most European countries. Only systemic and systemic transformations allowed for the development of real entrepreneurship. Of course, we did not immediately understand what real entrepreneurship is and how it is done, but the Polish nation is very active and determined in learning and catching up with the leaders of the European economy, and maybe even the world. We quickly saw market niches and started to compete with products on the increasingly difficult market.

The 21st century market is very demanding, customers are aware of the purchase, and the internet equips them with the necessary information about what they expect from the product to meet the functional and quality requirements. Entrepreneurship in action, innovation and openness to ideas not only to its own but also to the crew, with appropriate coordination can contribute to dynamic development, generating above–average profits and taking a leading market position not only in the region, but in the country or on the European market. Strong enterprises, combined with favorable policies and actions of the Government and legislative institutions, may result in a strong national economy in the future.

This article describes what entrepreneurship is and its importance for economic development. There is no possibility of dynamic economic development without an

entrepreneurial society, without innovative and developmental companies. It also shows how, in recent years, the entrepreneurship of Poles has changed on the basis of the latest research and the perception of enterprising people.

2. Entrepreneurship and economic development

The basic aspect of the entrepreneurial culture is the perception of entrepreneurs and their activities by the society of a given country. This is due to the fact that a person belongs to a proper community long before he begins to think about choosing his future career. The environment of this man gives him his opinions about entrepreneurs and their activities, the place of the entrepreneur in the social hierarchy, shows the picture as a man who runs his own business. Every story of business success and stigmatization has an impact on the choice and development of his career path.

Entrepreneurship is generally a fairly well-known concept with a fairly broad explanation in the field of management and economics. Certainly, it can be said that entrepreneurship has existed since the appearance of a man, but the importance of the term has evolved over the years. In the Middle Ages, the entrepreneur's concept usually referred to people who played a significant role in military or economic undertakings. In the 17th century, it concerned people taking the risk of profit or loss in contractual activities with the government. In the 18th century, it was described by units that risked providing capital and people who plan, organize, supervise and own property (Olko, 2003: 110).

The first person who attempted to define the concept of entrepreneur and entrepreneurship was the French economist R. Cantillon. In 1775, in a study entitled Essay on the essence of trade in general, he defined entrepreneurship as hunting for opportunities wherever local imbalances in the market could bring extraordinary profit (Lipski, 2005: www.ipis.pl). In his opinion, entrepreneurship is the ability to predict and propensity to take risks (Łuczak, 2003: 11). For entrepreneurs, he considered not only the owners of capital, but also beggars and thieves who, thanks to their actions, "worked" for their own maintenance (Foss, Klein, 2004: 10). According to R. Cantillon, anyone can become an entrepreneur, provided that he has two characteristic traits – "hunts" for bargains and takes risks (Bławat, 2003: 18).

The subject matter of entrepreneurship discussed by R. Cantillon was not initially noticed too much among researchers. Relatively little attention was paid to the representatives of the classical school, such as A. Smith and D. Ricardo. They also did not think that entrepreneurs have a positive impact on the economy, because it is governed by the "invisible hand of the market". In their works, they also rarely used the concept of entrepreneur, devoting more attention to ruthless capitalists. It was only J.S. Mill spread the term in British literature. However, he was still quite commonly associated in an absolute capitalist who exploited his employees in order to maximize personal profit (Łochnicka, 2016: 12). It was only at the turn of the 19th and 20th century that entrepreneurship entered the canon of economic considerations and began to notice its impact on the development of entire economic systems. A. Marshall was the first to recognize the organization of production (also known as production entrepreneurship) as the fourth

economic factor in the economy. This means that the entrepreneur, thanks to his actions, makes such combinations of other factors of production, to increase the efficiency of their use, or to obtain completely new, innovative solutions that contribute to the development of the entire organization.

Currently, in the economic literature, entrepreneurship is most often identified with establishing and running a business in an effective manner, aimed at achieving the highest positive financial results. This applies to both setting up small, family-owned companies as well as medium-sized enterprises. According to B. Piasecki, "entrepreneurship as a method of management finds its fullest expression in a small and medium enterprise" (Piasecki, 2001: 20), because these organizations are very flexible and energetic in their actions due to their size. The supporter of the above approach is, among others P. Drucker, who believes that entrepreneurship is at the heart of the creation of the enterprise. It manifests itself in effective, efficient and effective management, in adapting to changes taking place in the environment, as well as in taking risks. The economic expression of entrepreneurship is, according to him, the profit and development of the enterprise (Moczydłowska, Pacewicz, 2007: 9–10). R. Griffin is of a similar opinion, who claims that entrepreneurship is the process of organizing and running a business and taking related risks. In his opinion, it is of a procedural nature and is subject to the analysis of successive phenomena that remain between them in a causal relation (Griffin, 2008: 123).

The above statements may lead to the development of the opinion that currently in the 21st century, an entrepreneur who shows entrepreneurial attitudes is of great importance to the development of the economy. According to Cantillon, entrepreneurs are risk subjects who use arbitrage opportunities to buy goods at a certain price in order to sell them at an uncertain price, hoping for a higher price than the purchase price (Murphy, 1986: 98). According to the author, "the market system coordinates the activities of producers and consumers through an egoistic personal interest (Landreth, Colander, 1998: 91). The key actors of this system are, in his opinion, entrepreneurs who in their pursuit of profit cause social effects that exceed those that can be achieved by means of state interference (Gaweł, 2007: 15). An entrepreneur, according to J. Schumpeter, must stand out with ingenuity, innovation and perseverance in overcoming barriers and stereotypes. This author expressed the view that every entrepreneur is a business man, but not all business people can be entrepreneurs. He claimed that people become entrepreneurs when they make a new combination of production factors and take innovative actions. Their undertakings, on the other hand, lose their entrepreneurial character when the company's creation process is completed and it starts its regular operation (Alvarez, Agarwal, Sorenson, 2005: 59). When a company begins to stabilize its economic situation and does not record increases in sales year-to-year, then entrepreneurship disappears in it and falls into a period of decline. Only development companies contribute to economic growth.

The economic development is inseparably connected with the entrepreneurship of a given country. According to the free encyclopedia Wikipedia, economic development is a long-term process of change taking place in the economy. It includes both quantitative

changes related to production growth, employment, investment, size of functioning capital, income, consumption and other economic variables characterizing the economy from the quantitative side (economic growth), as well as accompanying changes of a qualitative nature (changes in public organization) and changes in structural nature. Economic development causes changes in the structure of Gross Domestic Product creation and changes in the employment structure. The benefit of economic development is an increase in the standard of living of the society, increased production and greater public safety (wikipedia.org, 2019). Therefore, it is a very wide and complex concept. The evolution of world economies and societies over the past two centuries leads to the conclusion that not muscles, not money, not natural resources (maybe still in addition to oil), but "brains" are the main factor contributing to the development of economies in current times (Piech, 2009: 133).

In the economics literature, there are many models of economic development, but this article refers to the most current and currently used, which was developed by Michael Porter (1990). He proposed an important model of economic development with three stages:

— development drawn by the basic factors of production (factor-driven),
— development based on investments (investment-driven),
— development based on innovation (innovation-driven) (creation of new technologies and competing on a global scale).

It coincides in part with the earlier Clark-Fisher model, but according to it, countries with a large share of the services sector, but with low incomes, would be more often classified in countries at the first or possibly the second stage of development. So it corresponds more to the contemporary look of the world (including the EU). This model is still regarded as a leading model and is widely quoted. Nowadays, the role of knowledge and innovations, especially at the "higher" levels of development, is increasingly taken into account. Of course, happiness is always needed, which helps in action, but 95% that determines success is knowledge.

Thus, the entrepreneurial attitudes of the citizens of a given country have a huge impact on economic development in the 21st century. Open minds, logically and not figuratively thinking brains open to innovation and the impression of individual ideas for the life of the enterprise, and thus to the entire economic system of the country, determine the economic position of a given country. In the 21st century, for the national economy to be able to count in the global system, it must be innovative, dynamic and based on healthy, creative enterprises that are able to generate above-average profits as a result of innovative activities. Strong companies that supply the highest quality products that meet the expectations of even the most demanding customers will contribute to the economic growth and production of the growing Gross Domestic Product and will ensure greater tax revenues to the state budget.

3. Entrepreneurship of Poles in the light of research

The entrepreneurial attitude of Poles has changed over the years. Until 1989, it was difficult to talk about the attitudes of entrepreneurship and creativity, because the economic system by itself was not conducive to such activities. All attitudes of entrepreneurship were rather blunted, because in a socialist economy, the entrepreneur was the enemy of the system and had to be destroyed. It was only the political changes after 1989 that initiated the dynamic development and change of social attitudes in Poland. The economy was liberated, the free market was introduced and macroeconomic mechanisms could only function. Therefore, Polish society in terms of entrepreneurial activity is young, because we have only been operating in an economy based on economic freedom for about 30 years. In comparison to Western European countries or the American economy, it is still a school period. However, Poles learn quickly and successfully succeed in the global economy.

This chapter presents the latest research results from the report on entrepreneurial attitudes carried out by PARP in 2017 and made their own interpretation and included own research results of the author in this topic carried out in 2017–2018 among entrepreneurs from the Łomża region. The research was conducted on the basis of direct interviews and talks with entrepreneurs, and their results are similar to PARP results.

Data obtained during the last edition of the research conducted in 2016 in the Global Entrepreneurship Monitor project indicate that almost 62% of adult Poles are convinced that their own business is a good way to make a career. Slightly less, because 56% of us share the view that people who set up a company and succeed in this field should be recognized. In comparison with Poles, EU residents are less inclined to pursue their profession, running their own business, and at the same time more share the view that business winners deserve distinction (57% and 67% of adults say so).

The above data are weaker than those recorded in 2011, when GEM research in Poland was started. At that time, as many as 73% of Poles were of the opinion that their own company is a good way to implement professional plans, and 64% thought that the entrepreneurs who achieved success should be respected and recognized. At the same time, the last two years show a clear slowdown in this negative trend.

On the other hand, a positive change can be seen in the indicator illustrating the social perception of the involvement of public media and entities present on the Internet in the transfer of content related to entrepreneurship. The percentage of Poles who see in these sources the content of new companies that achieved success reached 58% in 2016 and exceeded the average result for the EU (54%). A year earlier it stopped at 52%, which was an extremely low result in the last 6 years. The improvement in this area proves that the subject of entrepreneurship is now more often noticed by Polish society, and therefore it can be assumed that it is also more often present in public media or the Internet.

Much more favorable changes are visible in the attitudes of pro-entrepreneurial Poles. According to data for 2016, 21% of us declare the will to start a business by 2019, 40% see business opportunities in their environment, and 60% think that they

have sufficient qualifications and skills to run a business. In each of these aspects, we are better off than EU residents (where 12% of adults plan to start their own business, 37% recognize business opportunities in the environment, and 44% assess their preparation for the role of entrepreneur). What's more, all indicators have increased compared to the previous edition of the study. Entrepreneurial intentions relatively the least, by 1 pp, much more the other two indicators. The percentage of people positively assessing their entrepreneurial qualifications increased by 4 pp, however the biggest jump was recorded in terms of the percentage of people who perceive their surroundings as a good place to start a business. In 2015, this type of people accounted for 33% of the population, 7 pp. less than today. It is worth noting that the increase in the percentage of people noticing opportunities in their environment for establishing a company in Poland in 2016 was so strong that for the first time since the beginning of GEM research, the result was better than the EU average. A positive change in this last aspect may be evidence of improving conditions of doing business or a certain stabilization when it comes to reluctance to take risks, which is the transition to your own. According to data for 2016, as in the previous year, the percentage of Poles who claimed to see business opportunities in their environment, but did not decide to start a company because of the fear of failure was 48%. Odium's failure in business remains a barrier to the development of entrepreneurship in our country. For comparison, in the EU, 41% of residents live among the people who identify the opportunity to start a business in the neighborhood.

In 2016, nearly 2.9 million Poles started or ran a business for no more than 3.5 years. These people form the key indicator for young companies in the GEM – Total Early-Stage Entrepreneurial Activity (TEA). Last year it reached a record level of 10.7% of the adult population, throughout all previous years (2011–2015) it fluctuated around 9% (which accounted for approx. 2.4 million people). The share of mature companies, i.e. people who have been in business for more than 3.5 years, is currently 7.1% of the adult population. Compared to the EU, entrepreneurship in Poland can therefore definitely be called a young – with a similar level of mature enterprises (about 7% in the EU), in our country there is a greater saturation of people setting up their businesses or running them for a period not longer than 3.5 years (in the EU this percentage is 8.6%).

The year 2016 brought positive changes not only in the area of young companies. Almost twice the percentage of companies on the market from 3 to 42 months (from 3.5% to 6.1%), the percentage of mature companies increased slightly (by 1 pp compared with the previous year). The share of persons undertaking the first steps towards setting up a company slightly decreased, ie entities operating on the market for up to 3 months – from almost 5.7% in 2015 to 4.6% in 2016. The percentage of people who in the last 12 years has also increased. months have ceased to run a business – from 2.7% to 3.8% of the adult population, in the EU this indicator is 2.8%. And although this situation should not seriously worry, as the higher exit rate from business is appropriate for countries that are characterized by a high percentage of people setting up a business, which is undoubtedly Poland, it should be pointed out another problem. In Poland, less than 20% of people terminating their activities leave it in the hands of another owner, others liquidate it (relation 1 to 5). In the EU, this ratio is 1 to 3.

Among the two motivation to start a business – GEM, understood as the willingness to take advantage of the opportunity offered by running your own business to improve your living standard by increasing personal income or gaining independence and necessity, meaning that you cannot find paid employment, nowadays in Poland is the chance. 52% of people who run a young company admitted that they set up a business, guided by the desire to increase the standard of living, 27% – because of the necessity. In 2016, for the first time since the beginning of GEM research in Poland, the percentage of entrepreneurs guided by the opportunity reached a result equal to the EU average (52%), while the level of entrepreneurs who run the company due to lack of other opportunities is still higher than the EU average, which currently is 20%. The structure of motivation characteristic of young entrepreneurs in a given country translates into the quality of enterprises. Companies whose owners are motivated by the desire to seize the opportunity are more likely to create jobs, engage in more risky innovative ventures and develop better than those whose owners have been forced to move to their own. This is why the changes registered in 2016 are so positive, when the percentage of young companies motivated positively once again increased compared to the previous year (from 46% to 52%), while the percentage of companies assumed by necessity decreased slightly (from 28% to just under 27%).

The structure of young companies in Poland is dominated by service enterprises. Currently, they account for almost 70% of companies at an early stage of development, with 36% being companies providing services to individual clients, and 33% – to business clients. In the last year, the share of companies providing business services has increased sharply – by 8 pp, while the share of companies offering services to individual clients has not changed.

The second, after services, the sector chosen by people running young companies is industrial production. Currently, almost 29% of young companies are active in this sector, although 37% still a year earlier. The smallest number of companies operates in the mining sector – 2.4%. The industry structure of EU companies is slightly different: companies in the B2B sector account for 44% of young entities, B2C – 26%, fewer industrial production (23%) and more – 6%. Over the last year, but also all six years of conducting GEM research in Poland, the structure of young companies shows an increase in the importance of the services sector, especially B2B services (by nearly 60% in 2011–2016) and a decline in the industrial production sector (by 40%) .

Young entrepreneurs operating in Poland have higher growth aspirations than their counterparts in the EU. As many as 30% of Polish entrepreneurs declare their willingness to create a minimum of 5 jobs by 2021, and 25% – a minimum of 10 places and an increase in employment by at least 50% in this period. In the EU, 26 and 17% of entrepreneurs have such plans. Over the last six years, but also in the last year, the percentage of entrepreneurs with medium development plans has decreased (at least 5 jobs). On the other hand, the share of those with high ambitions in the area of job creation increased in 2016 by 5 pp. y / y. As indicated by GEM data for 2016, as a country, together with Ireland, Slovenia, Croatia, Hungary and Estonia, we note one of the six best, because

the lowest results in terms of the percentage of companies that do not plan to increase employment (declares 41% young companies in Poland, 48% in the EU).

Data for 2016, like those presented in the previous edition of the Report, indicate that it is younger companies that use the latest technologies more often. In Poland, 5% of young companies declare the use of technologies available on the market for a year, 23% – technologies present from one to five years, and the most, as 72% – technologies older than 5 years. In the group of mature companies (present on the market at least 3.5 years), the interest is respectively: 0%, 10% and 90%. Compared with the EU, Polish young companies are more often based on older technologies – in the EU an average of 14%, i.e. almost three times as many young companies than us, uses solutions no older than one year. Only slightly less, because 21% uses technologies available for 5 years and 65 – older than 5 years. Also when it comes to mature companies – the EU counterparts of Polish entities perform slightly better: 5% use the latest technologies, the same – up to 5 years and 5 p.p. fewer – the oldest solutions.

People who run young companies in Poland more often than in the EU perceive their offer as new on the market. 16% of young companies from Poland considered their product to be new for all customers, and 42% for a new one for some customers, in the EU consider on average 14% and 32%, respectively, of people running a young business. A large group of entrepreneurs in our country still perceive their offer as known to all clients, in the EU there are more such entrepreneurs among young entities, as 54%. Also in this respect, mature companies perform worse, both in Poland and in the EU – in our country 58% of these entrepreneurs, and in the EU – 71% offer products that do not bear the novelty for customers.

Although the majority of young companies in Poland perceive their offer as a new one on the market, as much as 65% think that it operates in conditions of high competition. Only 5% are of the opinion that there are no other companies in their vicinity that offer similar products, the remaining group (30%) thinks that there are a few such companies. With a longer presence on the market, the sense of competition threat increases – 82% of mature companies in our country see many companies with similar products in their environment. Polish companies, both young and mature, feel the breath of competition more than their EU counterparts – there 9% of young and 4% of mature enterprises declare no competitors, while 53% of young and 68% of mature – many companies in the vicinity with a similar offer.

According to data from 2016, almost 44% of young enterprises focus exclusively on the domestic market. Similarly, as 43% of companies are moderately internationalized – declared revenues from customers from abroad in this group constitute up to 25% of the total revenues of these entities. Much less among the young companies are high and very highly internationalized entities – 6% are entities that derive revenues from abroad at the level of 25–75% of total revenues, less than 8% – those whose revenues from abroad amount to min. 75% of revenues. The above situation, however, looks much better if we refer it to the previous edition of the research. Currently, Polish young companies are more and more willing to cooperate with clients from abroad – the percentage of companies that operate only on the domestic market fell by 1/3 (from almost 60%

in 2015), the percentage of moderately internationalized companies increased by 1/3 (from 30%), and the percentage of over 75% of revenues from abroad has more than doubled (3% in 2015). Only the share of companies deriving high revenues from abroad decreased, but very slightly (by 1 pp, less than 8% in 2015). Currently, the majority of people who started their business in 2014 declare a minimum or higher level of internationalization (56%), ie they earn revenues from foreign customers at the level of at least 1% of annual revenues. Even in the last year's Report it was indicated that in each of the surveyed groups of young companies as Poland, we have weaker results than the average for Europe. The latest data indicates a change in this situation. In the EU there are on average fewer non-internationalized companies (by 4 pp less than in Poland) and more highly and very highly internationalized (in the first of these groups 13% – ie twice as many, in the second 9% – by 2 pp higher). At the same time, for the first time in Poland there are more companies that start their adventure with exports (43% compared to 38% in the EU).

Women in Poland do not differ significantly from men when it comes to recognizing business opportunities – 39% women vs. 40% of men say they see them in their environment. However, they feel more worried about starting their own business than men, and assess their preparation for this role less well. 54% of women with 67% of men think that they have enough skills to run their own business, while 62% of women feel fear of failure.

Similarly, as far as the entrepreneurial attitudes of women and men are concerned, it is in EU countries. Despite this, the comparison of the attitudes of women in our country to those from the EU shows that Polish women more often see business opportunities in their environment (by 5 percentage points more than in the EU), are more convinced about having sufficient skills to run a business (result by 18 p.p. higher than in the EU); however, they often feel fear of failure (by 11 p.p. less in the EU). Data for the last – 2016 show a slight decrease in these fears among women in our country (at the same time, in the case of men, this index rose by 3 pp y / y). There was also an improvement in the percentage of women noticing business opportunities in their environment (increase from 32% to 39% in 2016), and above all self-evaluation of entrepreneurial abilities. As recently as in 2015, 48% of women in Poland recognized their skills and qualifications as sufficient to run a business, currently 54% of residents of our country think so.

The appetite of Polish women for their own business is clearly improving. Over 19% of women in Poland in the survey realized in 2016 declared their willingness to start a business within 3 years, i.e. by 46%, i.e. 6 pp. more than in 2014. For comparison, 12% of women have such plans in the EU, this indicator is similar to the level from 2 years ago. Perhaps so. gender gap between the percentage of companies run by men vs. those carried out by women will be reduced when these plans come true. Currently, however, 8% of women assume or develop their own business for no more than 3.5 years, among men of this type of people is 13%. In the EU among women, 6% of women are involved in entrepreneurship and 11% of men (PARP, 2017).

Entrepreneurs from the Łomża region are of similar opinion. On most issues, they confirm all of the above indicators. Even despite the peripheral location of Łomża, more

and more companies sell to European markets, especially from the furniture and carpentry industries, where Łomża and its surroundings are well developed (around 30 companies in this industry). Young companies are open to modern technologies, also from the IT industry. The Park Przemysłowy, which was established in 2015, helps to develop. It supports newly established companies in the provision of premises with full infrastructure, legal and accounting services. Young entrepreneurs are open to new ideas, are not afraid of challenges and demonstrate entrepreneurial attitude.

However, there are several problems in the development of entrepreneurship in Poland. The most frequently mentioned are excessive bureaucracy and too complicated tax system. Entrepreneurs also often mention as a problem in the development of innovation very poor cooperation between universities and business, which translates into poor R & D quality. Education is still the Achilles' heel of the Polish institutional support system. Its role is quite specific because it does not affect current, but rather future and potential entrepreneurs. It also strongly influences the social perception of entrepreneurship. Primary and secondary education was rated the lowest of all areas. Such a low assessment of the area was particularly affected by the supply of inadequate knowledge of the functioning of the economy and entrepreneurship.

The instability of law in Poland was a very important element that entrepreneurs paid attention to. The changes in the law that took place in 2017 and 2018 were so numerous that the majority complained about the need for constant adaptation of the company to the applicable regulations, which translated into higher costs and lowering the company's income.

Summing up, the entrepreneurship of Poles is constantly being improved and more and more deeply rooted in the market economy. Poles are by nature an entrepreneurial nation and able to learn quickly, use the best Western patterns. They transfer certain solutions to the domestic market, improving them and successfully using them in their current operations. It is a pity that we are buying new machines and devices, but not the most modern, technologically most involved. In the west, these machines are successfully used, but in Poland we are constantly struggling with the problem of financing the most modern technologies, which are still very expensive.

4. Conclusions

The influence of Polish entrepreneurship on economic development is indisputable. This is an indispensable element to try to catch up with the most developed countries of the world with greater dynamism. The Polish market economy is relatively young compared to mature western economies, but this does not mean that we cannot enter the group of the most technologically advanced countries in a few years. Ingenuity and openness, creativity and entrepreneurship are the strengths of Poles. We are a large about 40 million country in Europe and we can, and even should be, the strength of the European economy.

From the above-quoted research results, a rather optimistic picture of the entrepreneurship of Poles emerges and its impact on dynamic economic development. Poles are

increasingly taking up entrepreneurial activities, are not afraid to start a business, show greater preparation for running a business on their own. According to experts, it is worrying that the number of people wanting to set up their own businesses is reduced, for those who want to be wage earners. Self-employment involves responsibility not only for yourself, the fate of the company, but also for your own families, employees and their families. Many people do not want such responsibility and therefore prefer wage labor.

However, the conclusions which result from the conducted research are optimistic. You just need to streamline the following elements:

— reduce bureaucracy and, where possible, reduce the number of documents as quickly as possible without paper-based computer services;
— simplification of the tax system, making it more friendly to entrepreneurs, especially from the SME sector;
— stabilization of the law, if possible, freezing deep changes for a period of time, to allow companies to grow steadily;
— improvement of cooperation between universities and enterprises, which will contribute to a significant development of R & D;
— encouraging entrepreneurs to take up innovative and development activities that will improve the competitiveness of Polish companies in the international arena.

These activities will accelerate economic development, contribute to its long-term consolidation. The most important in this respect are the Government's actions to show pro-entrepreneurial attitudes, do not turn too much towards the social state, because it places a heavy burden on the tax system as well as the entrepreneurs themselves.

Only an efficient state, introducing modern solutions aimed at encouraging entrepreneurial activities can ensure sustainable and long-term development. Dynamically developing companies that apply state-of-the-art solutions in their field will ensure, first of all, higher incomes and, consequently, higher revenues to the state budget due to taxes.

The issues raised in this article are extremely important from an economic point of view and very important for the smooth functioning of the State. It is surely to continue to observe the market, changes taking place on it and draw conclusions that will contribute to the consolidation of long-term development. Research conducted in this area may be helpful in making important decisions by the Government, but also through the legislative institutions, so that our law will be more and more friendly to entrepreneurs.

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Chapter **2**

ECOSYSTEM AND RELATIONSHIPS WITHIN THE SUPPORT OF ACADEMIC ENTREPRENEURSHIP

Urszula Kobylińska[2]

1. Introduction

In the literature on the subject, it is postulated that modern universities change the current model of entrepreneurial organization (created in the twentieth century) on the so-called the 3rd generation university model, also referred to as creative, proactive, pro-innovative, fulfilling tasks in the field of education, research and development, also the mission of creating mutual relations with the environment. And it is not only about "individual" ad hoc initiatives, but lasting, appropriate quality relations aimed at supporting academic entrepreneurship. It is about creating a specific ecosystem of the university, which creates favorable conditions for cooperation between many entities, i.e. University, business incubators, technology transfer centers, financial support institutions, etc. involved in supporting academic entrepreneurship. An ecosystem based on high-quality relationships between entities can affect the loyalty of partners involved in cooperation, their behaviour, willingness to get involved and help, thus being an important factor conducive to achieving a better result of cooperation from the point of view of academic entrepreneurship.

In recent years, there has been increased interest in how universities can transition to become more entrepreneurial (Etzkowitz, 2008). Driven by the emergence of the triple helix and more recently quadruple helix structures (Carayannis, Campbell, 2012) universities are increasingly expected to leverage their knowledge in pursuit of economic and social development within their regions (Feldmann, 2014: 453–477). However, university knowledge transfer and business engagement is a complex activity, particularly when the majority of university knowledge transfer activities are discretionary activities (Perkmann et al. 2013:423–442) as in many European universities academics are often only rewarded for teaching, research and selected commercialisation activities. Despite this, at a strategic level university funding is now increasingly dependent upon their engagement with industry and society. This has driven a shift in the respective universities' business models (Miller et al., 2014:265–287.). As part of this transition toward

more commercial engagement, many academics are faced with the introduction of academic standards where they are expected to engage in a wide range of knowledge transfer activities, despite internal performance and reward mechanisms not formally recognising many of these activities (McAdam et al., 2016). Knowledge transfer activities can take the form of more formal transactional activities such as spin out companies, patents, licensing to more informal and collaborative activities such as networking, joint industry conferences and publications and contract or collaborative research (Alexander, Childe, 2012). This shift in emphasis around academic roles has sparked the debate about the need for academics to evolve to become more entrepreneurial – this has been presented as academic entrepreneurs or more recently as in terms of Entrepreneurial Academics.

Early empirical work carried out initially in the USA in the 1980s of the 20th century, in the subject of academic entrepreneurship, focused mainly on including subjects and courses in the subject of entrepreneurship in the study programs. Research shows that the university culture and entrepreneurship programs implemented at the university can positively influence student motivation and attitudes (Boh et al. 2016, Pittaway, Cope, 2007: 479–510.). The following years were devoted to empirical research in the field of relations between the university and business, thanks to which knowledge transfer from the university to business could take place faster. Researchers have, for example, proved that learning from action and building appropriate networks is more effective than teaching entrepreneurship within the university walls, which is much more effective in stimulating entrepreneurial behavior (Rasmussen, Sorheim 2006: 509–517). Enabling students to interact with entrepreneurs and small business owners provides students with patterns, practical skills and extensive networks (Brindley, Ritchie 2000: 430–457, Fukugawa 2005: 379–401). Recent research in the field of academic entrepreneurship focuses on the role of the ecosystem of support in the development of entrepreneurial attitudes at universities, which justifies the need to understand the elements that shape this ecosystem (e.g. Wright and Mustar, 2017: 909–922; Gurrero et al., 2017:1–9) . Without such empirical research it is difficult to create appropriate programs and projects supporting such initiatives.

The current direction of European policy is focused on the development of innovative undertakings, which causes, among others, increased interest in academic entrepreneurship, the search for new forms of technology transfer, stimulation of building academic spin-off companies, motivating the academic environment to take economic initiatives. However, while American experience in the field of academic entrepreneurship dates back to the 1980s, in Poland issues become more and more important only after a year. This can be proved by the number of publications on this subject even if in Scopus database (only 23 publications of Polish authors in the subject of academic entrepreneurship, which have appeared in international journal databases mainly since 2015).

In the literature in recent years has been underlined meaning of the support ecosystem as a key factor to extend academic entrepreneurship. Ecosystem is understood often as a “connectors” that bridge people, ideas and resources in academia and local communities are particularly important for early stage projects, as they facilitate the access to stakeholders in the community who are in a position to offer often required critical

support (Maia, Claro, 2017: 641). In particular there is a lack of research into the factors affecting the willingness of academics and students to become more entrepreneurial in their activities and the perceived legitimacy of these activities within universities. This exploratory research helps to fill this gap by exploring the importance of individual institutions building the support ecosystem.

Therefore, the aim of the article is to define the key aspects shaping the ecosystem of academic entrepreneurship, i.e. the main actors, elements of relations and tools for supporting the ecosystem in the opinion of its representatives from two cities: Białystok and Rzeszów (east part of Poland). The method used in the study is direct interviews with people involved in academic entrepreneurship. The subjects of the research were representatives of the broadly understood support ecosystem: representatives of university authorities, cities, technology transfer centers, incubators, and academic entrepreneurs. Investigations described in the article seek to address this conspicuous gap in the literature by investigating the role and factors associated with important elements of the ecosystem building support for academic entrepreneurship The theoretical analysis in this study has been limited to indicating the dimensions/factors shaping the support ecosystem, with particular emphasis on their impact on the effectiveness of inter-organizational cooperation. In particular, the author tries to answer the following question: what are the key aspects of building an ecosystem of support for academic entrepreneurship, aimed at supporting academic entrepreneurship?

The paper is organized as follows. Section 1 is introduction. Section 2 reviews the modest but emergent literature that examines to role of academic entrepreunership and it ecosystem. Section 3 discusses the methodological approach taken in the present study while Section 4 presents the findings of the investigation. Finally, it discussed the implications of the paper for policy as well as future research.

2. The literature perspective

2.1. Academic entrepreneurship

The concept of academic entrepreneurship in recent years has been making a career all over the world – also under other names, including technological entrepreneurship, innovative entrepreneurship, intellectual entrepreneurship, technostarters. The term “academic entrepreneurship” was originally intended to refer to the expansion of business entrepreneurship to an academic environment and only to distinguish between enterprises based on academic knowledge and others. The dominant definitions in English-language literature then changed from the idea of establishing profit-oriented enterprises at universities and focused on the basic role of university spin-offs (Shane, 2004; Wright, 2017: 909–922).

Later, other authors proposed a view on academic entrepreneurship as a way of transferring knowledge from the university environment to the market. This wider interpretation of academic entrepreneurship covered all academic contacts with economic entities that are the basis for creating market value. In another perspective, academic

entrepreneurship is presented as: all activities that go beyond traditional academic teaching and/or research roles are innovative, bring with it an element of risk and lead to financial benefits for individual academic employees or their institutions (Abreu, Grinevich 2013: 408–422). Finally, although not necessarily negating the significance of economic results generated by these forms of entrepreneurship, some authors consider academic entrepreneurship as oriented to creating social value (Botes 2015, Kingma 2011). In a simpler approach, academic entrepreneurship is defined as the synthesis and integration of scientific, academic and commercial activities (Etzkowitz, 2008: 64–77). It is often characterized by formal arrangements regarding intellectual property commercialization of academic property through knowledge (e.g. consultations or contracted research), technology transfer (e.g. patent or licensing) and transfer of products or services, e.g. spin offs (Radosevich, 2005: 879–893).

Academic entrepreneurship occurs at the level of individuals or groups of people acting independently or within departments or other university units who create new organizations or initiate innovations inside or outside the university (Tijssen, 2006: 1569–1585). While early work in this area has mainly focused on measuring knowledge transfer at universities (patents, licenses, spin-offs) and analyzing initiatives that could affect the effectiveness of this activity (Siegel et al. 2003: 27–48) in recent years there have been more and more frequent attempts to analyze factors that lead students and researchers to show entrepreneurial behaviours (Nyeko, Sing 2015: 1050–1055).

Academic entrepreneurship in Poland, just like in English-language literature, is interpreted very differently. In the domestic literature, the most common approaches to academic entrepreneurship define it as "all kinds of engagement of scientific institutions, scientific workers, auxiliary and administration, PhD students and students in business." In another approach, also as: "business activity of people from the academic environment, which consists in the establishment by scientists, doctoral students and students of activities at the university or in its vicinity" (Guliński, Wajda, 2005: 77–78). In a narrower sense, academic entrepreneurship is limited to the involvement of researchers in the creation of new enterprises, the so-called spin-out (Szara, Pierścieniak, 2013) or spin-off (Plawgo, 2011). It is identified, among others, as raising students for entrepreneurship and promoting entrepreneurship; with support for entrepreneurs who are students, PhD students and research workers; with supporting the transfer of knowledge and new technologies to the economy (Developing the model ..., 2006: 61). The Polish legal system imposes on universities the obligation to educate all students of social sciences so that they are ready to "think and act in an entrepreneurial manner" (Moczydłowska, 2017: 70). The existing university model, based on education and scientific research, is extended to include preparation for entrepreneurship, understood as shaping proactive behaviour enabling independent action on the market.

2.2. Determinants and support entities of academic support ecosystem

An entrepreneurial academic support ecosystem has many dimensions. It includes entrepreneurship courses, incubators, accelerators, grants, and business plan competitions.

Such an ecosystem also has vital formal and informal rules and regulations governing a society (North 1990; Autio et al. 2014: 1097–1108). Formal institutional features include the rule of law and property rights. Informal institutional mechanisms refer to sanctions, traditions, and codes of conduct. Engaging the *ecosystem* – "Connectors" that bridge people, ideas and resources in academia and local communities are particularly important for early stage projects, as they facilitate the access to stakeholders in the community who are in a position to offer often required critical support (Maia, Claro, 2017).

The creation of a new venture by students or recent alumni is also influenced by the university context and especially, the characteristics of the region within which a university is located (Bergman et al., 2016; Hayter et al., 2017). This finding indicates that while individual characteristics and education programs are influential, importance is attached to the coordination of university programs with the wider entrepreneurial ecosystem and the development of such an ecosystem.

Entities creating the ecosystem of academic entrepreneurship support may be entities both directly related to the academic and non-academic environment (Table 1). Analyzing in more detail the entities involved in the process of supporting academic entrepreneurship, in which it is important to maintain a high quality of relationships, they can be divided into three groups: entities closely related to academic entrepreneurship, entities being a potential environment for academic entrepreneurship and partners that can support such initiatives. A natural source initiating the process of promoting academic entrepreneurship and forming the ecosystem of support can be the university authorities, and its advocates are students, graduates, PhD students, and lecturers. The university also has the possibility of separating the unit within its structure, acting to support academic entrepreneurship (e.g. incubator, career office, entrepreneurial centre) or have its representatives in the structure of other support institutions (e.g. science and technology parks, technology transfer centres). The proposal to create a support structure may also flow from outside, e.g. from another institution, i.e. a regional development foundation, an entrepreneurship development agency implementing the project from external funds, e.g. from EU funds. It is from the initiators of the creation of the support structure that the largest involvement in the coordination of the academic entrepreneurship process is expected.

In order for the ecosystem of academic entrepreneurship support to bring the assumed results, i.e. to intensify the entrepreneurial attitudes of the academic community, interaction must exist between the support entities based on commitment, trust and cooperation. In other words, the relationships between support participants must be of high quality. The quality of relations between entities involved in supporting academic entrepreneurship can be understood as added value shaped by the type of ties between exchange subjects characterized by the degree of compliance of organizational cultures, styles of decision making and convergence of perceived values (Kobylińska, 2018). Appropriately shaped level of quality of relations between these entities may contribute to the intensification of entrepreneurial activities of people referred to as academic entrepreneurs.

Table 1

Entities creating the ecosystem of support for academic entrepreneurship (AE)

Subject category	Types of entities
Entities that directly create the ecosystem of academic entrepreneurship	– University – academic business incubators – technology transfer centres – technology parks – advanced technology centres
Entities that are a potential support ecosystem	– higher education institutions that do not run academic entrepreneurship centres, but are connected through the profile of the didactic offer with the area of the economy based on knowledge, innovation and advanced technologies – research institutes and centres not involved in academic entrepreneurship – career offices
Partners of the support ecosystem	– authorities and employees of chambers of commerce and industry, employers' organizations, buyers, craftsmen cooperating with university; – city, town hall authorities cooperating with incubators, universities – entrepreneurs cooperating with universities or chambers

Source: own elaboration based on: Opracowanie modelu wspierania PA w Wielkopolsce, Public Profits, Poznań 2007.

3. Methodology

3.1. Study approach

This article empirically verifies the importance of individual elements of the ecosystem of supporting academic entrepreneurship. As a research method, structured interviews with representatives of the support ecosystem described in the previous part of the article were accepted. Respondents were people directly or indirectly involved in academic entrepreneurship and structure partners: students, representatives of university authorities, technology transfer centres, cities, associations and foundations for entrepreneurship. Research on the phenomenon of entrepreneurship is often criticized for relying on structured surveys, predetermined measurements and working assumptions that exclude more inductive reactions (e.g. Cliff 1998: 523–542, Brush 1992: 27–35, Shane et al., 2003). In such cases, a qualitative approach is recommended, in particular when there is not yet a well-structured theory (theoretical models) in the study topic (Cooper, 2003: 21–36).

As a research area, two cities were accepted: Białystok and Rzeszów. They are cities of similar size, located in eastern part of Poland. A total of 15 interviews were conducted. After the initial selection of the research material, 10 transcripts were selected for description and application in this article. The described exploratory research adopts an interpretative attitude and constitutes the first step in a broader and more thorough examination of the relationship in the field of supporting academic entrepreneurship. The goal of this step is to refine the research questions, check the suitability of the research instrument and better define the cohorts of respondents for a broader study. For the purpose of this article, the answer to the following research questions was accepted:

Q1 – What institutions / entities play an important role in building an ecosystem of support for academic entrepreneurship?

Q2 – What are the key elements of a high-quality inter-organizational relationship supporting academic entrepreneurship?

Q3 – What are the barriers to building relationships between entities involved in the process of supporting academic entrepreneurship?

Q4 – What actions should be taken to strengthen relationships and involvement in supporting academic entrepreneurship?

The Table 2 contains information about respondents.

Table 2

Information about respondents

Interview-ee №	The respondent/ institution	Position	Roles in the supporting of ecosystem university
1	Representative of the BUT authorities	V-ce rector	Actions to develop cooperation with the economic environment
2	Bialystok University of Technology	BUT student Academic entrepreneur	Patent application for the Patent Office in Poland
3	Career Officer	Head of the Career office (BUT)	Training, career counseling for students, organization of job fairs, maintaining relationships with the environment
4	Science and Technology Park Białystok (STP)	Project specialist	Entrepreneurship classes at BUT, trainings, workshops, etc
5	Institute of Innovation and Technology (IIT) (Białystok)	Head	Commercialization, building lasting cooperation between science and business

continued tab 2.

6	Technology Transfer Center (TTC) (Rzeszów)	Head	Transfer of the results of intellectual works to the economy, supporting the scientific and research activities of the university's academic staff
7	Foundation for Supporting Education at the Aviation Valley Association	Head	Education for entrepreneurship among young people
8	City Hall (Rzeszów)	Startup Officer	Active participation in the development of the startup community
9	Rzeszów Regional Development Agency (RRDA)	Project specialist	Supporting entrepreneurs, developing the startup community
10	Rzeszów University of Technology	Academic entrepreneur, academic teacher	Development of IT solutions for the needs of people with disabilities

Sources: own research

4. Findings

The empirical study showed some interesting conclusions. First of all, the majority of respondents notice that the University should play a key role in building relationships in the field of supporting academic entrepreneurship. In particular in the area of coordination/ initiation of cooperation and moderation of tasks. Secondly, the key to building a high quality relationship is the involvement of all participants in the cooperation and good communication between them. Respondents notice that it is best that there are not too extensive structures for cooperation, because then there are more problems with communication. Certainly, the number of existing entities that can provide support is sufficient, it should perhaps be more educated for academic entrepreneurs, at what stage of the project can go to a specific institution. As the respondents note, there are many barriers in the area of support for academic entrepreneurs that can be eliminated with a small financial effort. As they note, often the reason for the lack of sufficient cooperation between institutions is to focus on their own tasks and ignorance of the specificity of the goals of other institutions also involved in supporting academic entrepreneurship. On the other hand, however, small interest of potential academic entrepreneurs in establishing relations with support institutions is noticeable. The motives of a lack of willingness and interest in commercialization may result in further empirical research.

The interview results are described in more detail below. The Table 3 summarizes the main conclusions from the research.

3.1. Key entities in building relationships in the field of support for academic entrepreneurship

The question addressed to the respondents concerned the selection of key institutions responsible for building relations in the field of supporting academic entrepreneurship. Most of the respondents recognized that the University plays the key role of the integrator and coordinator of cooperation. As one of the respondents pointed out*:* "*the most important is the mother* (*university*), *which can offer help*, *support*, *education and gaining*, *also spinoff or spinout related to the university and then a financial injection in the form of business angels*" (Rzeszów City Hall). "*The university and incubators have the largest tools to reach academic entrepreneurship*" (Science Park representatives). "*The relationship building starts at the university*" (*Career office*, Białystok). There was no lack of comments that: "*Universities should show entrepreneurship a little more on specific examples*" (Foundation, Rzeszów). According to the respondents, "*you definitely should not create another institution*, *being*, *umbrella*" (TTC, Rzeszów). "*Simply the communication needs to be improved*" (RRDA, Rzeszów). One of the respondents broke the pattern of thinking and suggested that: "*the institution responsible for building relationships supporting academic entrepreneurship should never be a university*, *and personally should not be a person with a strictly scientific background*, *but with a business background*, *understanding the market*, *because the scientist understands the scientist, and they will not understand the business completely*" (IIT, Białystok). In turn, in the student's opinion, "*entrepreneurs play a key role in building relationships*, *and the university certainly does not associate students with supporting entrepreneurship*" (Student, academic entrepreneur, Białystok).

3.2. Key factors for establishing relationships in the field of supporting academic entrepreneurship

As indicated in the previous part of the article, the key to the development of academic entrepreneurship is cooperation and maintaining good relations in the group of entities that constitute the ecosystem of supporting. The participants of the interviews were presented with the definition of the quality of relations and the factors that are most often mentioned in the literature as key to the success of inter-organizational cooperation. The quality of the relationship was understood as *the climate between organizations*, *which consists of such factors as*: *the level of trust*, *commitment*, *communication*, *satisfaction and avoiding conflicts*, *determining the extent to which the relationship can meet the needs of a given entity.*

For the respondents, engagement and trust were the key to maintaining relationships among entities in area of supporting .academic entrepreneurship. One of the participants of the study noted that: "*The involvement results from communication and no conflict of interest. This commitment is crucial. Not only declarative that we are signing another contract. But the commitment expressed by the participants of the cooperation*" (RRDA, Rzeszów). As the representative of the university's authorities pointed out*:* "*the level*

of engagement can be controlled, but building trust is something more. It's like being a family. This feeling is born successively. You have to be with companies and not be". In the opinion of an academic entrepreneur, "*key is trust and communication and university missions of beeing linker/integrator of such cooperation*". On the other hand, from the point of view of companies, the basis will be the lack of a conflict of interest. If there is a conflict of interest then there is no cooperation. "*For me personally this trust is the foundation and commitment*" (Foundation, Rzeszów). The Park's representative notices "*that involvement due to the issue of access to students*, *the university has the greatest potential for involvement. From my perspective*, *this is a difficult*, *complex subject*, *because each of these organizations has different goals*". The IIT representative justifies that "*the degree of trust is crucial because both environments have completely different priorities. The business environment has expectations 0/1 – or we earn or not. The university's environment has its priorities*, *and the generation of income is on one place there*".

3.3. Barriers in building relationships with other entities (i.e. incubator, science and technology park, technology transfer centres, entrepreneurs, etc.) in the field of supporting academic entrepreneurship

When asked about barriers to building relationships, only one of the respondents did not notice any restrictions. The other respondents notice mental, procedural and legal barriers. A representative of the university authorities notes that "*scientists have too little contact with the industry and often*: *they have no idea what problems are in industry. Such a situation causes that scientists create projects from the bottom up*, "*into a drawer*" *because the market does not need them*". This is confirmed by another of the respondents who, well aware of the scientific community, notes that "*scientists are too attached to their research topics*, *often more than there is a demand for them*" (IIT, Białystok). Another respondent notes that "*the reason for the lack of sufficient cooperation between institutions is focusing on their own tasks and ignorance of the specificity of the goals of other institutions also involved in supporting academic entrepreneurship*". Two others respondents see barriers at the legal (procedural) and macroeconomic level (state policy, % rates, entrepreneurial climate in the country) the same as in the case of other entrepreneurs, not only academic ones. On the other hand, entrepreneurs notice too little help from the university in the field of commercialization of research results and procedural barriers related to among others with the time of waiting for a patent, which may reduce the motivation and desire to develop the idea (Student, academic entrepreneur).

3.4. Tools can strengthen the development of relationships for the support of academic entrepreneurship

In the opinion of the respondents, there is a lot to do in the area of strengthening relationships and how some of them are used to be the leader who will oversee the whole process. The Park's representative claims that: "*without systemic solutions* (*e.g.*

well-funded projects), *there is no chance of greater involvement of these entities from the bottom up. First*, *there must be resources*, *a project and then there may be development of cooperation.* Another respondent notes that it is "*necessary to change the system in educational programs. More show in practice how looks theory and cooperation A tool that can strengthen relationships can be the involvement of key brand entrepreneurs* (*for example*, *we have Samsung's incubator.*) *This attracts the best. This is the key to downloading brands*" (TTC, Rzeszów). In the opinion of RRDA representative is also important "*well-built system, structures*, *such as start-up structures. In the view of our institution financial and substantive tools will be key to success*". Similarly, the start-up officer, who thinks that "*the substantive*, *legal and image tools will be crucial for the development of such initiatives*, *another noted that the key is building awareness of cooperation from an early age*". Student suggest that "*the tool that strengthens the relationship for supporting entrepreneurship will be so-called head hunters* (*e.g. lecturers who can notice your potential and lead you to success*)". The representative of the university authorities thinks that "*to talk about cooperation and building relations between science and business, each lecturer should once every 10 years*, *valid half a year to work in industry* and in his opinion "*we have no idea what they are doing there.*"

Table 3

Summary of interview results

№	Institution	A key entity responsible for building relations between the university and the environment	Key factors for building relationships in the field of supporting academic entrepreneurship	Barriers to cooperation between institutions within the ecosystem	Relationship building tools
1	A representative of the university authorities (BUT)	University as an integrator of the relationship	✓ level of involvement of individual participants	Too little experience in cooperation with the industry (staff from University).	Obligation of periodic work of University's academic staff in industry.
2	Institute of Innovation and Technology (IIT) (Białystok)	It's never University. But a person from outside the university as a link between the university and business.	✓ degree of trust	Substantial barriers (90% of university projects are created from the bottom up, so they are not expected by the market, scientists are attached to their research topics).	Attract companies and encourage cooperation.
3	BUT student, Academic entrepreneur	Incubators	✓ trust and communication	Procedural barriers, e.g. a barrier is the time to wait for a patent.	A system of catching talents, enterprising people at the university.
4	Career Office (BUT)	University	✓ level of involvement	Focusing on your own interests and lack of knowledge what other institutions do	Only the leader who will take up the challenge of coordinating cooperation.

continued tab 3

5	Science and Technology Park B-stok (STP)	University and incubators	✓ level of involvement	I do not notice any barriers.	For example, well-funded projects focused on cooperation.
6	Technology Transfer Center (TTC) (Rzeszów)	University	✓ level of involvement	No people dealing with this topic alone. Lack of student interest.	Change a system in education programs. More show in practice how looks the theory.
7	Foundation for Supporting Education at the Aviation Valley Association (Rzeszów)	Foundations, associations	✓ trust and level of involvement of individual participants	Legal and macroeconomic limitations	The involvement of key brand entrepreneurs is certainly a magnet.
8	Rzeszów City Hall	University	✓ cooperation	Typical barriers at the macroeconomic level	Substantially, legally, image
9	Rzeszów Regional Development Agency (RRDA)	Certainly not create another entity, an umbrella	✓ level of involvement of individual participants	Too big partnership raises communication problems.	The involvement of key brand entrepreneurs
10	Academic entrepreneur, academic teacher	Incubators, Technology Transfer centres	✓ level of involvement of individual participants	Barriers related to the promotion and commercialization of research results.	Substantially, promotion of the entrepreneurs' ideas

Source: own research.

4. Conclusions and implications

The ecosystem framework we have outlined is comprehensive but also complex. A number of potential challenges need to be addressed. As the respondents' answers indicate, the University is expected to receive the most in the area of initiating, coordinating and managing the support ecosystem. It can be said that in the opinion of the respondents, the University should fulfil the role of an integrator of the relationship focused on supporting academic entrepreneurship. Incubators operating at universities also constitute an important ecosystem environment aimed at supporting academic entrepreneurs. The respondents were found to be involved in maintaining relationships as the involvement of cooperation partners and the trust that is built as a result of previous cooperation. As barriers to developing cooperation, respondents often noticed that ecosystem entities focus only on achieving their goals without going beyond their statutory obligations. Barriers also occur on the mental side (scientists have no practice in the industry and are too attached to their subjects), and the system of commercialization of research results is rather a long-term process. The respondents also notice a number of tools that can strengthen cooperation within the ecosystem. Again, the clear outlined leadership of one entity, which will moderate the relations, is also crucial, but also strives for projects aimed at the possibility of cooperation. It is also important to attract key brands that can be a magnet and motivator for entrepreneurs who will be interested in cooperation. A key challenge concerns the question of who designs the ecosystem. As has shown, an ecosystem is a result of various mechanisms and actors, in different contexts and evolves over time. Although universities play a crucial role in this process, they do not drive it. Student entrepreneurial ecosystems are co-created rather than one institution being at the centre of the process and managing it. Many stakeholders are engaged as co-creators: students, faculty, university managers, investors, angel networks, local authorities, start-ups and corporation. Each of these stakeholders has different objectives, norms, standards, and values. Thus, many dimensions of the ecosystem go beyond actions by universities.

Thus, a major challenge is: to what extent are ecosystems for student entrepreneurship deliberately designed top down or emerge organically from below? The complexity and variety we have identified suggest the need to develop mechanisms for bringing together the range of different stakeholders. Universities likely need to develop extensive and deep networks with these stakeholders for these mechanisms to be effective. These networks need to be able to link the different elements and levels of the ecosystem. This raises issues concerning whether one single ecosystem is feasible for a particular university or whether developing several sub-ecosystems piecemeal is likely to be more feasible.

Different parts of the ecosystem may have different and conflicting goals. For example, different departments and school within universities may have different goals regarding entrepreneurship and may seek to construct their own ecosystem for entrepreneurship. The interview results presented in this article are just an introduction to in-depth research on many aspects of building relationships within the ecosystem of supporting

academic entrepreneurship. This framework provides a number of implications for policy and research. It is evident that a once-size-fits-all approach to ecosystem design is too simplistic. The complexity of the ecosystem poses major challenges for its effective implementation. Research is needed, therefore, that explores empirically the drivers of the variety and the effectiveness of student entrepreneurial ecosystems. In particular, we know little about how these ecosystems emerge and evolve. To what extent are they deliberately designed or emerge organically?

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Chapter **3**

IMPACT OF ACADEMIC BUSINESS INCUBATORS (AIP) ON THE INFRASTRUCTURE LEVEL OF CENTRES SUPPORTING THE DEVELOPMENT OF ECONOMIC ACTIVITY IN POLAND

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1. Introduction

Transfer of innovative knowledge and practical application of research results in the economy are the most important tasks of the academic community in Poland, and at the same time an opportunity for enterprises to develop quickly. However, this requires both breaking the resistance and reluctance of the academic community to engage in commercial projects as well as the elimination of infrastructural barriers. It is infrastructure that is one of the basic determinants for the development of economic activity in Poland. Appropriate infrastructure, meeting the needs of both representatives of science and entrepreneurs is the basis for innovative development of the country.

The aim of the article is to identify the impact of Academic Business Incubators (AIP) on the infrastructure level of centers supporting economic activity development in Poland.

2. The essence and types of infrastructure

The definition of "infrastructure" comes from Latin infra- (under, below) and the structure (structure, layout), which determines, that the infrastructure should be treated as the basis of some arrangement or construction. Thus, to describe something as an infrastructure is to emphasize that it is about objects, devices, institutions or other phenomena that are considered as a foundation without which existence, development or proper functioning of system or some part of it is impossible" (Ratajczak, 1999, p. 11). Nowadays, infrastructure is defined as basic devices, enterprises and service institutions

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indispensably needed for the proper functioning of production sectors of the economy (Kopaliński, 2000, p. 229).

Truskolaski (2006, p. 57) defined this concept in the following way: "the infrastructure is adopted by basic devices serving society and the economy, satisfying the needs of movement, health, education, public order, environment, sport, recreation and culture, widely available, paid and unpaid, with limited payment or compensated payment". The most well-known approach to the definition of infrastructure is to use it in the sense of various types of facilities and equipment. In this meaning, the term infrastructure is limited to two capital: material and intellectual. Material capital is the product of human activity as a consequence of investment. Intellectual capital is made up of people who use material capital, providing social and economic services (Truskolaski, 2006, p. 58).

In the literature on the subject, the infrastructure is divided into: material, institutional and population. According to the Universal Economic Dictionary (Główczyk, 2000, p. 111) material infrastructure are: roads, bridges, canals, railway tracks, transhipment stations, ports, airports, all kinds of buildings and general-purpose buildings, communication and information devices and everything that is located underground (water, sewage, energy, other elements of utilities). Infrastructure investments, in particular material are highly capital intensive, have a long cycle of investment and payback rate and low yields (Główczyk, 2000, p. 111).

Infrastructure means technical means and institutions necessary to ensure the proper functioning of production and service activities as well as to shape the desired living conditions of the population.

The basic division of infrastructure (Główczyk, 2000, p. 111) is presented below:

1. Material infrastructure, which consists of roads, railways, bridges, canals, ports, airports, reloading stations, general-purpose buildings, IT equipment, communication devices, but also networks: energy, water, sewage and other elements of utilities.
2. Institutional infrastructure, which includes all kinds of systems for self-organization of population, including administrative, banking, insurance, scientific and research systems and others.
3. Population infrastructure, which is constituted by all kinds of systems and devices, and these comprise general skills and the level of human culture, as well as their health and mental condition, which is a condition for their activity, innovation and ability to solve problems.

According to F. Kapusta (2012, s. 315), the concept of infrastructure should be understood technical means and institutions necessary for the proper functioning of production and service activities and the development of desirable living conditions of the population. From this definition it follows that:

— infrastructure means technical resources – they are an indicator of economic development and standard of living, and at the same time stimulate all activities;
— infrastructure are also institutions creating a framework (atmosphere) of all the activities and life of the population.

In the literature on the subject (Kapusta, 2012, p. 315) it is often distinguished:

a) technical infrastructure,

b) social infrastructure,
c) organization infrastructure,
d) logistic infrastructure,
e) business infrastructure.

The authors of the publication tend to consider the infrastructure in the meaning of: technical means, premises, computer and multimedia facilities, IT systems and information systems serving the development of centers supporting economic activity (entrepreneurship) in Poland, and at the same time stimulating all economic activity. Infrastructure plays an important role in the development of a given unit (country, region, university). It is a stimulating factor for development. It can be concluded that the proper development of infrastructure leads to the development of units, eg.: universities, the country, the region, providing the basis for raising the level of economic activity in Poland.

3. Infrastructure as determinant of economic activity development in Poland

Transfer of innovative knowledge and practical application of research results in the economy are the most important tasks of the academic community in Poland, and at the same time an opportunity for enterprises to develop quickly. However, this requires both overcoming the resistance and reluctance of the academic community to engage in commercial projects as well as to eliminate infrastructure barriers. It is infrastructure that is one of the basic determinants of the development of economic activity in Poland. Appropriate infrastructure, meeting the needs of both representatives of science and entrepreneurs is the basis for innovative development of the country.

Entrepreneurship in the literature of the subject is variously defined. Its replacement terms are: technological entrepreneurship, innovative entrepreneurship, intellectual entrepreneurship. One of the types of entrepreneurship is academic entrepreneurship. According to several example definitions, academic entrepreneurship is:

— all types of involvement: scientific institutions, academics, PhD students and other students in business (Plawgo, 2011, p. 7);
— a new, attractive mechanism of commercialization of scientific know-how, allowing to multiply the benefits of a scientist (discoverer) and other scientific and business partners (university, capital investors) (Banerski, Gryzik, Matusiak, Mażewska, Stawasz, 2009, p. 7);
— various types of activities: universities, its researchers, PhD students, students, graduates in order to commercialize the results of their scientific research, in other words, in order to make practical use of scientific achievements in business (Academic Innovation Platform, 2012);
— activity in the field of technology transfer to business practice and the functioning of enterprises based on knowledge and research programs implemented by: students, PhD students and researchers (Ćwiek, 2012, p. 413);
— business activity of people professionally connected with the university (research workers), as well as those for whom the stay at the university is a certain stage in

the life of students or doctoral students, and also includes promotion of entrepreneurship, entrepreneurship education, and activation of entrepreneurship (Banerski et al., 2009, p. 33).

Academic entrepreneurship can therefore be understood in two ways. First of all, it can be considered entrepreneurship of the university itself as a separate entity well managed and properly organized. Secondly, academic entrepreneurship can be understood as the entrepreneurship of university-related people, i.e. academic, scientific and teaching employees, auxiliaries and administrators, as well as graduate and undergraduate students and graduates. Therefore, the university should not be treated only as an institution educating future staff for the economy, but it should also create conditions for using the knowledge of students, graduates and researchers in practice.

The precursor of this type of activities were academic centers in the USA, where after World War II Stanford University and the Massachusetts Institute of Technology (MIT) initiated scientific-research cooperation with business representatives. Among the European Union countries, Finland has a good example of creating academic entrepreneurship through the use of the policy of supporting newly established companies. The policy supporting creation of academic companies in Finland is based on a wide cooperation of institutions that support technology transfer to investors. Examples of Finnish companies based on academic entrepreneurship are companies from the nanotechnology industry, such as: Genano, KSV instruments, Nanolab Systems. Other examples of cooperation academic centers with the practice of economic life are the University of Philadelphia (USA), British universities: Cambridge, Heriott-Watt in Edinburgh, University of Stuttgart, Aachen Mining Academy, Technical University of Berlin and University of Lund (Sweden).

In Poland, academic entrepreneurship was incorporated into the legal system in 2005. The principles of functioning of public and non-public higher education institutions are regulated by the law on higher education. The Law on Higher Education (Act, 2005) contains provisions indicating that higher education institutions cooperate with the environment and spread the idea of entrepreneurship in the academic environment. Academic entrepreneurship is a new pattern of thinking, shows that attempts to commercialize research results do not contradict the principles of research work and the attitude of the scientific community.

In order to use its intellectual and technical potential as well as to transfer the results of R&D works to the economy, universities can run academic business incubator and technology transfer centers. The above undertakings may be implemented in the form of an university-wide unit, foundation or commercial company. Technology transfer centers are created to sell or transfer the results of research to the economy free of charge. However, in order to commercialize R&D results, the university may organize a special purpose company whose main task is to take up shares in capital companies or create capital companies that deal with the implementation of research results or development works conducted at the university. Despite the fact that special purpose companies, like academic business incubators and technology transfer centers, aim at paying

the sale development results for a fee, then special purpose vehicles have a narrower scope (Barszcz, 2013, p. 37).

The development of academic entrepreneurship is conditioned by numerous determinants. The basic determinant is the increase of knowledge as a factor of production. The experience of other European Union countries confirms that the current model of a scientific institution, including a university, is complemented with preparation for entrepreneurial activities and shaping active and independent behaviors on the labor market. The academic community should approach the business practice. First of all, the common direction of development of scientific institutions is to cooperate with the broadly understood business, i.e. mainly with local, small companies. Secondly, educational and scientific institutions should also be oriented towards creating positive attitudes and entrepreneurial abilities among their own didactic and scientific staff as well as students and graduates.

There are a number of sources of interest in the issues of entrepreneurship in the academic environment (Matusiak, Zasiadły, 2005, p. 145–148):

— in the activities concerning the commercialization of new ideas from science to the economy, the "inventor-entrepreneur" model turns out to be particularly effective, enabling the current correction of new solutions in terms of market and consumer expectations;
— the growing innovative pressure leads to a shortening of the time from the idea to the market use ("who is faster, the better"), which requires spatial approximation of the company and scientific institution or university, scientist and entrepreneur. Innovation increasingly becoming a product of the environment in which entrepreneur operates (innovative environment);
— intensified search for new increasing the income forms of universities and scientific institutions by streamlining the channels of communication and cooperation with business, and consequently selling of technology and research services.

One of the key factors for economic activity of the academic environment in Poland is infrastructure. The right infrastructure for the needs of the world of science and business is the basis for the country's innovative development.

Science and technology parks and academic business centers are very important elements of the infrastructure. They have tools that facilitate and support cooperation between enterprises and research centers. Therefore, they favor the stimulation of innovative development of the economy.

Thus, science and technology parks are reduced in scale, but very functional innovation systems necessary for the modern economy. They are a place for creating and improving innovative solutions, and also enable real cooperation between science and business. Business Incubators are, in turn, organized economic complexes with technical and technological facilities and intellectual capital indispensable for innovation development. Their main goal is to support start-ups and concerns two basic areas – housing assistance and business-related services. Recently, business incubators have become the main sphere of research centers in Poland – they are established as centers of entrepreneurship at both public and private universities. Academic Business Incubators (AIP),

created thanks to the involvement of universities and EU funds, have already created a nationwide network of support and development of entrepreneurship among: students, graduates and scientific staff (Wierżyński, 2012).

The International Association of Science Parks (IASP) has adopted a definition (Bąkowski, Mażewska, 2012, p. 25) saying that a technology park (scientific, research, etc.) is an organization managed by qualified specialists whose aim is to improve the well-being of the community in which it operates by promoting: innovation culture, competition among entrepreneurs and knowledge-based institutions.

International experience confirms that one of the success factors of technology parks is the proximity of a university that is active in the field of academic entrepreneurship, as well as effective, multi-faceted network contacts with the scientific community. First of all, they help to develop cooperation between science and business, which favors combining the market-oriented offer of representatives of science and entrepreneurs' expectations. Technology parks should therefore support the commercialization of research results.

Another element of technical infrastructure that has an impact on level of entrepreneurship development is the Academic Business Incubators (AIP). They function in the form of an university-wide unit subordinated directly to the rector or vice-rector and constitute an element of the institutional structure of the entrepreneurial university model, as well as within the framework of the Academic Business Incubators Foundation.

The activity of Academic Business Incubators is mainly developed by the academic community. Their goal is to help them prepare for the future creation of the company and an initial assessment of the chances of its success on the market. Incubators perform their statutory tasks in education and entrepreneurship promotion sphere, as well as supporting activities for the commercialization of new products and technologies. The idea of supporting academic entrepreneurship assumes active involvement in educational processes (Bąkowski et al., 2012, p. 55) thanks to the use of tools such as:

— creating a wide network of external contacts with: risk investors, graduate associations, other business support institutions;
— organization of training and consultancy for potential entrepreneurs academic;
— promotional campaigns related to entrepreneurial activities;
— university competitions for business plans among students, PhD students and young researchers;
— creation and development of academic creativity centers.
— Academic incubators generate many benefits for universities (Bąkowski et al., 2012, p. 57), directly covering:
— making the educational offer more attractive and improving the image of the university;
— improving relations with the environment and local business;
— increasing income from cooperation and technology transfer to graduate companies;
— increasing orders and sponsoring research activities;
— obtaining additional funds from programs to support technological entrepreneurship;

— additional income opportunities for students and researchers as well as engineering and technical employees.

According to S. Harbi El Sana and A.R. Anderson (2010, for: Gruszewska, 2013, p. 277), creation of appropriate institutions has positive effects in the form of business dynamics. It also strengthens attitudes that promote progress. Therefore, appropriate economic infrastructure should be built to support entrepreneurship and the related innovation.

In conclusion, it can be stated that academic entrepreneurship based on innovation is a basic element of the state's innovation policy. Therefore it requires development of appropriate legislation and regulations. Reorienting the universities to cooperation with the business environment is a long-term process that also requires mentality changes of the academic community and appropriate internal regulations. Transfer of knowledge from science to business will be more efficient if it is ensured both at national, regional and state support. The factors mentioned in the literature that have a beneficial effect on the efficient cooperation between companies and universities – besides the direct financial support, technology transfer, business contacts – include also appropriate infrastructure.

4. Identification and evaluation the impact of academic business incubators (AIP) on infrastructure level of centers supporting economic activity development in Poland – attempt to analyze based on own research

As mentioned, it is hard to imagine development of economic activity in Poland without providing the necessary infrastructure. Both the pre-incubation process and technology transfer center at the university require adequately office rooms, equipped with ICT devices, appropriate software and office furniture. An important process for academic incubators was Measure 1.3. SPO WKP28 (2004–2006), including funds for: consulting, promotion, executive study and, above all, investments. However, it turned out that the applicant can not be a university, but only science and technology, industrial and technological parks. Nevertheless, in several cases, funding for the construction of technology incubators has been granted to science and technology parks, which are associated with universities, such as: Wrocław University of Technology, Adam Mickiewicz University in Poznań and University of Lodz.

According to this, academic incubators operating at these universities have also benefited. As a result, in 2006 the first technological incubators in Poland were established. The next investments were created thanks to guaranteeing funds for this type of investment in subsequent programming periods. The possibility of co-financing operation of technology transfer centers from the structural funds (IROP 2004–2006, measure 2.6) has prompted several universities in the Poland to intensify existing activities or establishing new university technology transfer centers (e.g. University of Warsaw, Jagiellonian University, Adam Mickiewicz University in Poznań, Wrocław University of Technology). Thanks to this, incubators were equipped with computers, furniture and funds for operating activities. It is argued (Guliński et al., 2005, p. 33) that in the next

years there will also be funds in the European Union structural funds for the continuation of activities, related to the functioning of academic incubators.

The important aspect of creating business activity in Poland is the project implemented by Academic Business Incubators (AIP) called "Droga do Polski Przedsiębiorczej". The goal of the project is to make and implement a joint system of academic entrepreneurship creation in Poland, in the form of institutions co-operating with each other, such as: Academic Business Incubators (AIP) and Business Links incubators. The main task of this project is to create a pre-incubation – incubation system, containing pro-innovative services for people starting their business and testing their ideas as a part of Academic Business Incubators (AIP) and incubation services for young companies, in particular technology companies that have gone through the pre-incubation phase, have used the Academic Incubators Entrepreneurship (AIP) and naturally can go through incubation phase, getting appropriate help in Business Link incubators. An important issue is the fact that the project "Droga do Polski Przedsiębiorczej" is mostly addressed to people from academic community, who do not have a registered business activity (Inkubatory.pl, 2012) or who already run a business activity and are looking for opportunities to take advantage of incubators(Siemieniuk, 2016, p. 153).

The project financed by the European Union "Droga do Przedsiębiorcza Przedsiębiorcza" is a project developed by the Academic Business Incubators (AIP), aimed at developing modern, pro-innovative services for the SME sector and supporting the implementation of innovative organizational, technical and IT solutions. Mentioned above actions are implemented by creating a pre-incubation system, consisting of fifty incubators network, as well as nine AIP Business Link. Implementation the project from European Union funds enabled creation of new, innovative enterprises in Poland and their dynamic development all over the country. The subject of the project is modernization and development potential of business environment in Poland in provision of pro-innovative services for startups, by launching modern 50 Academic Business Incubators (AIP), pre-incubating AIP and 9 Business Link, the so-called AIP BL business centers. The project created two ecosystems of pro-innovative services for AIP and AIP BL, which were integrated and implemented as part of advanced IT system. The "Droga do Polski Przedsiębiorczej" project is part of the stream of activities inspired by the European Action Plan for Innovation – Innovation Action Plan, thanks to stimulating and developing entrepreneurial attitudes in Europe (Inkubatory.pl, 2012).

Main target groups of the business support network created by Academic Business Incubators (AIP) and AIP Business Link are (Przedsiębiorca.pl, 2010):

— in the field of pre-incubation within the framework of Academic Business Incubators (AIP) are: students, graduates, PhD students, young employees of science, universities and others, that is people who have not registered business activity. Beneficiaries as part of the pre-incubation process can test business ideas without the need to set up a business, acting as a branch of Academic Business Incubators, taking advantage of AIP legal personality, which simplifies and activates both the establishment and running of their own business, and eliminates numerous legislative and administrative barriers;

— in the field of incubation in AIP Business Link they are: companies in the initial stage of development, mainly enterprises from the ICT and e-business sectors that have passed the pre-incubation phase in Academic Business Incubators (AIP) and are really prepared for functioning in a competitive market.

As part of the services offered by the Academic Business Incubators (AIP), young entrepreneurs may, among others, rent fully-equipped office space, use the virtual address service, training and consulting services and participate in numerous networking events. For startups prepared to develop their own products on foreign markets, the program of international acceleration "Ready to Go", enabling a trip to: USA, Israel, Great Britain or China has been developed. Thanks to the "Droga do Polski Przedsiębiorczej" project a few thousand of successful startup initiatives have been supported. Development and production of the innovative cosmetic product – GLOV – by Phenicoptere can be used as an example. Thanks to the special fibers, the GLOV glove with high accuracy removes make-up with using only water, moreover product can be used for up to three months. Phenicoptere received the title of Startup of the Year 2012 in Poland (Serwis Programu Inteligentny Rozwój, 2015).

As mentioned, the project financed by the European Union called "Droga do Polski Przedsiębiorczej" is the largest and most important project supporting economic activity in Poland, acquired by the Academic Business Incubators (AIP). The total value of the project – financed from "Innowacyjna Gospodarka" EU Program was extended to PLN 65 million from PLN 25 million in the initial phase of implementation. The overall implementation of the project includes creation of Academic Business Incubators (AIP) and technologically advanced groups of business centers – AIP Business Link (Polska Przedsiębiorcza, 2018). Table 1 presents Business Link business centers operating in Poland with expenditures on infrastructure supporting economic activity in the region.

AIP Business Link operate in the following cities in Poland: Warsaw, Lublin, Katowice, Szczecin, Poznań, Kraków, Trójmiasto, Wrocław, and Łódź. In AIP Business Link Warszawa, the value of investment in infrastructure (facility) was PLN 5 292 626.25. In AIP Business Link Lublin, the value of investments in infrastructure (facility) was PLN 1 785 398.98. In AIP Business Link Katowice, the value of investment in infrastructure (facility) was PLN 1 730 275.71. In AIP Business Link Szczecin, the value of investment in infrastructure (facility) was PLN 1 727 824.29. In AIP Business Link Poznań, the value of investments in infrastructure (facility) was PLN 1 501 452.25. In AIP Business Link Kraków, the value of investment in infrastructure (facility) was PLN 1 501 399.98. In AIP Business Link Trójmiasto, the value of investments in infrastructure (facility) was PLN 1 385 544.62. In AIP Business Link Wrocław, the value of investment in infrastructure (facility) was PLN 1 174 293.19. In AIP Business Link Łódź, the value of investments in infrastructure (facility) was PLN 722 984.54. In total, PLN 16 821 899.81 was allocated to infrastructure in Business Links.

As T. Truskolaski writes (2006, p. 68): infrastructure activates economically regions (acceleration tasks). (...) one should emphasize the function of infrastructure as a stimulus of the economic situation, which is one of the parts of the big push theory, that is,

the allocation of resources that would encourage the initiation of development and then stimulate its stimulation.

Table 1

Business Link centers operating in Poland

No.	Name of Business Link	Value of investments in infrastructure (facility) in PLN
1	AIP BL Warszawa	5 292 726.25
2	AIP BL Lublin	1 785 398.98
3	AIP BL Katowice	1 730 275.71
4	AIP BL Szczecin	1 727 824.29
5	AIP BL Poznań	1 501 452.25
6	AIP BL Kraków	1 501 399.98
7	AIP BL Trójmiasto	1 385 544.62
8	AIP BL Wrocław	1 174 293.19
9	AIP BL Łódź	722 984.54
Total		16 821 899.81

Source: own elaboration based on the AIP documentation.

Data on investment in infrastructure to dynamize economic activity in individual regions in Poland, as well as research conducted among startups functioning as part of Academic Business Incubators (AIP) show how important role Academic Business Incubators (AIP) play in development of academic centers infrastructure in Poland.

To the question in the study: "*Do you think the AIP office is needed at a university*?" which was a closed question, all respondents answered in a way that AIP's offices are necessary at universities to stimulate the economic activity of a given region of the country, university, etc. The test data is contained in Table 2.

Table 2

Do you think the AIP office is needed at a university?

Answer	Survey responses	Percent
Yes	90	100.0
No	0	0.0

Source: own elaboration based on surveys.

Question: "*What devices do you use in AIP office*?" was a multiple choice question, where there was a possibility to mark all the answers, therefore the results were not added up to 100. All responses of the interviewed startups indicated the need for the Academic Business Incubator (AIP) offices to operate at universities, as shown in Table 3.

Table 3

Respondents (N) who use technical facilities within AIP offices at universities

Type of technical facility	Responses		N percent[4]
	N	Percent	
Computers	68	17.2	73.9
Printers	66	16.7	71.7
Copiers	65	16.4	70.7
Multimedia facilities	53	13.4	57.6
Office desks	73	18.4	79.3
Conference room with facilities	71	17.9	77.2
Total	396	100.0	

Source: own elaboration based on surveys.

The analysis of answers to the above question (Table 3) shows that respondents use all the devices provided by AIP in offices located in each university: a desk for work (18.4%), conference rooms with facilities (17.9%), computers (17.2%), printers (16.7%), photocopiers (16.4%), multimedia facilities (13.4%). Table 4 shows the results divided to individual Academic Business Incubators.

Table 4

Respondents (N) using technical facilities of AIP offices with individual AIPs division

AIP	Computers		Printers		Copiers		Multimedia facilities		Office desks		Conference room with facilities		Total	
	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N
AIP Białystok	19	18	17	16	21	19	13	12	19	18	19	18	108	100
AIP Gdańsk	6	21	6	21	3	10	2	7	7	24	5	17	29	100
AIP Olsztyn	11	17	11	17	11	17	11	17	11	17	11	17	66	100
AIP Śląsk	4	18	5	23	3	14	2	9	6	27	2	9	22	100
AIP Poznań	5	14	5	14	5	14	5	14	7	20	8	23	35	100

[4] The total of N percentage does not sum up, because one person could check.

AIP SGH Warszawa	11	17	11	17	11	17	10	15	11	17	12	18	66	100
AIP SGGW – WSHiP Warszawa	4	17	4	17	4	17	3	13	4	17	5	21	24	100

Source: own elaboration based on surveys.

4. Conclusions

Academic Business Incubators (AIP) are pursuing their vision through three major initiatives:

— Academic Entrepreneurship Incubators (AIP) is the largest network of business incubators in Europe, being the fastest, cheapest and least risky places to test business ideas on the market. Nowaday, as part of incubators, about 1 600 startups per month are testing their business ideas;
— AIP Seed Capital is an innovative seed fund, investing in the best Polish startups. The fund offers the simplest and most effective system of investing in Polish startups. In addition to financial resources AIP Seed Capital provides also mentoring gurus startups, access to the second round of investment, including the participation of investors from Silicon Valley as well. AIP Seed Capital has so far made 49 capital input into innovative companies, each time with at least PLN 100 000 for a 15% stake. Another 84 investments were completed by the end of 2015;
— AIP Business Link is a network of development centers for startups. As part of one preferential package of services, comprehensive services are made available to customers, allowing the company to be operated easily and effectively from anywhere in the world. In addition, the offer includes: comfortable work places, modern conference rooms, meeting rooms with multimedia facilities and networking spaces. AIP Business Link is represented by laboratories, or places that favor creative work. Nowaday, around 200 startups use Business Link services every month.

According to authors' research, technical means, premises, computer and multimedia facilities, IT systems and IT systems providing development of centers supporting economic activity (entrepreneurship) in Poland are the stimulants of all economic activities. Infrastructure plays an important role in the development of a given unit (country, region, university). It is a factor stimulating development of the economy. It can be concluded that the proper development of infrastructure leads also to the development of units, eg universities, the country or the region, providing basis for raising the level of economic activity in Poland.

Analyzing data mentioned in the article, it can be stated that Academic Business Incubators have a significant impact on the infrastructure level of business centers

developing economic activity in Poland, stimulating at the same time all economic activity, which has an impact on development entrepreneurship of the Polish society.

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Chapter **4**

POLICY OF WAŁBRZYCH AGGLOMERATION COMMUNES IN THE FIELD OF SUPPORTING ENTREPRENEURSHIP AND NEW INVESTMENTS – OPINIONS OF STAKEHOLDERS

Agnieszka Mroczek-Czetwertyńska, Beata Detyna[5]

1. Introduction

Unquestionably entrepreneurs constitute a key factor of the social and economic growth of a country and local societies as well. From data available in the literature it results (Barczyk, 2010; Cieślik, Koładkiewicz, 2014; Dropek, 2014; Grycuk, Zdrojek, 2015; Entrepreneurship in Poland, 2017) that only some of communes take relevant steps intended to support the entrepreneurship and a few of them fully apply available tools. Supreme Audit Office (NIK), in the light of audits, which took place 2014–2017[6], concerning aid for entrepreneurship provided by communes emphasized that territorial self-government units should:

— take steps intended to develop entrepreneurship and achieve success by local entrepreneurs,
— enhance life quality and satisfy needs of their inhabitants as well as to improve condition of the infrastructure,
— make attempts to increase the employment rate and quality of jobs as well as growth in the self-government incomes (NIK, 2018).

Mostly, more of audited territorial self-government (73%) did not establish any organizational cells directly responsible for fulfillment of tasks intended to support the entrepreneurship and the economic growth. In half of self-governments (48%) issues of support for entrepreneurship have never been examined by a city council commission. In the light of audits conducted by NIK only every third commune made, from 2014 to 2017, effective operations designed to establish business surrounding organizations.

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[6] The survey included 48 communes in eight voivodships including two urban nature communes (cities with number of inhabitants than 100k), urban-rural nature or rural nature communes.

Among the afore-mentioned organizations there functioned: credit guarantee funds (28% audited communes), business incubators (19%), investor service centers (15%), local development agencies (14%), lending funds (13%), business development centers (11%), industrial parks (10%), technological parks (8%) and information centers (8%). Just a few communes (12%) had business growth programs – as separate planning documents. In some of communes these documents were established in cooperation with entrepreneurs and local communities. Among dominating forms of investment advantages promotion of communes were: Internet website of the commune or public information bulletin – BIP (88%), promotional materials regarding that is leaflets, folders (69%), participation in fairs and contests for communes (37%) as well as consultation and information points (12%).

On the basis of review of the literature it is concluded that the key factors supporting the entrepreneurship and new investments in communes are:

- favorable geographical localization,
- well-developed road infrastructure,
- stable tax policy,
- developed investment areas,
- local labor market,
- ability to absorb external funds,
- preferential tax rates and discounts for entrepreneurs,
- competitiveness in relation to neighboring communes,
- favorable and effective local legal regulations,
- partnership with other territorial self-government,
- cooperation with non-government organizations (Kibler, 2013; Müller, 2013; Skica, Bem, Daszyńska-Żygadło, 2013; *Entrepreneurship at a Glance*, 2014; Płaziak, Rachwał, 2015; Legutko-Kobus, 2016; Ferry, Kah, Bachtler, 2018).

Effectiveness of efforts made by communes in order to support the entrepreneurship, to large extent, depends on their initiatives and ability to use planning tools, legal administrative tools, infrastructural tools, economic and financial tools as well as institutional and organizational ones. It should be mentioned that the range and selection of these tools is not limited or imposed by legal regulations.

From 2016 to 2018 authors of the paper realized the scientific project titled "Impact of the logistics growth on the competitiveness of the Wałbrzych Agglomeration – analysis and review of contemporary trends". Main goal of the research was establishing development concepts realized in the Wałbrzych Agglomeration (WA) in the context of social and economic conditions of logistics growth (including logistics infrastructure) of the Wałbrzych and communes belonging to AW, as well as recommended pro-development operations in selected areas (Detyna, Mroczek-Czetwertyńska, 2019). Subject of the research was, among others, opinions of varied groups of involved parties on WA communes in terms of support intended for entrepreneurs and new investments. This paper presents opinions on this issue given by inhabitants, entrepreneurs and representatives of self-governments belonging to the Agglomeration. The paper includes, among others, postulates of interviewees (inhabitants and entrepreneurs) concerning larger aid provided

by self-governments to persons who plan and who already run economic operation. Authors presented also a genesis of establishing the Wałbrzych Agglomeration as a functional area. Communes, which established it, made an obligation to cooperate together in order to assure conditions for sustained development in the entire WA area, and to accept and implement the common development strategy.

2. Wałbrzych Agglomeration as a functional area

Wałbrzych Agglomeration was set up on 04.04.2012 by virtue of the "Wałbrzych Agglomeration Declaration". In the declaration it was written among others: "Representing inhabitants of the Wałbrzych Agglomeration living in the rural and urban areas of communes (...) and giving consideration to experiences from previous cooperation as well as thesis included in "Assumptions of the Wałbrzych Agglomeration Development Program by 2020" we express our will to continue common operations intended to fulfill the Wałbrzych Agglomeration Declaration" (Deklaracja Aglomeracji Wałbrzyskiej, 2012). Initially the Declaration was accepted by representatives of 14 communes including: Boguszów-Gorce, Czarny Bór, Głuszyca, Jedlina-Zdrój, Kamienna Góra, Mieroszów, Nowa Ruda (urban commune), Nowa Ruda (rural), Radków, Szczawno Zdrój, Stare Bogaczowice, Świebodzice, Walim and Wałbrzych. In the document it was emphasized that the communes, which enter the WA, undertake to fulfill the tasks included in the Strategy Europe 2020. At the same time, using potential arising from 300k inhabitants of the Wałbrzych Agglomeration, the communes undertook:

— Intensify cooperation in order to assure conditions of a regular growth in the entire area of the Wałbrzych Agglomeration;
— To accept the common Wałbrzych Agglomeration Development Strategy where there are established objectives and the following significant challenges:
  – Wałbrzych Agglomeration available for everyone,
  – Wałbrzych Agglomeration as a better place for workers,
  – Wałbrzych Agglomeration as a better place to live,
— Following rules of partnership, mutual respect and heading for the sustainable growth of the entire Agglomeration;
— Development of Special Operational Program for the Wałbrzych Agglomeration for 2014–2020 including strategic goals of the AW and directions arising from the Cohesion Policy of the European Union in the period 2014–2020; it will be an action plan including issues of territorial integration regarding the Agglomeration.
— Cooperation with the Dolnośląskie Voivodeship Managing Authority and Ministry of Regional Development in order to determine financial tools necessary to support fulfillment of the Wałbrzych Agglomeration Development Strategy.
— Mutual actions in order to make the Agglomeration a beneficiary of the new European way of providing aid for special functional areas which the WA is.

Into the Declaration it was also entered that this is a certificate of partnership, ability to cooperate and it defines standards of territorial integration. The President, city mayors

and village mayors undertook to submit the text of the Declaration to Commune Councils – in order to have it approved. By acclamation it was approved that a leader of works related with the Agglomeration is the President of Wałbrzych City. Half year from establishing the AW, on 31.10.2012, two other communes were included into the Agglomeration: Lubawka and Kamienna Góra (rural commune), and in 2013 the following communes joined the Agglomeration: Świdnica (urban commune), Świdnica (rural commune), Jaworzyna Śląska, Strzegom, Żarów, Dobromierz and Marcinowice. Radków Commune left the Agglomeration in 2014, hence, presently 22 communes belong to it. Area of the Wałbrzych Agglomeration presently equals 1748 km^2 (that is 9.46% area of Dolnośląskie Voivodeship) and in 2017 it had 402 115 inhabitants (http://aglomeracja-walbrzyska.pl/aglomeracja-walbrzyska). Approx. 18.3% of the WA area are urban areas (for the entire Dolnośląskie Voivodeship this index equals approx. 11%).

Among 6 priorities defined in the "Wałbrzych Agglomeration Development Strategy for 2013–2020" (which constitutes basis for strategic objectives) there are:

PR1 – „Dynamic economy and innovative entrepreneurship". When characterizing this priority it was emphasized that WA communes should:

— Support establishing and development of enterprises – including those inspired by external investors and new companies, based on existing endogenous potentials. Also, it is significant to accelerate changes in this area. Condition of the growth in question is greater innovativeness as well;
— to undertake initiatives oriented to establishing an offer adjusted to Wałbrzych and the entire Agglomeration;
— to support undertakings oriented to modern products assuring the financial profit for entrepreneurs and share of the WA in the market of partners for industries based on growth of technologies or creative approaches of employees.

This priority has been translated into a strategic objective (CS1.1), worded „New economic profile based on activity of modern companies". In order to achieve it there have been specified particular directions and actions have been planned. Among main directions there were enumerated: cooperation of the business sector with the science sector, incubation of innovative companies, efforts to attract external companies as well as establishing attractive conditions for investors (Strategia Rozwoju Aglomeracji Wałbrzyskiej na lata 2013–2020).

3. Research methodology

In order to familiarize with a policy realized by the Wałbrzych Agglomeration in terms of aid for the entrepreneurship and new investments, the authors planned questionnaires for varied groups of involved parties – inhabitants, entrepreneurs and territorial self-governments. Methodology of the research included both, on-line questionnaires and interviews (focused and in-depth interviews). Questionnaires were filled by WA inhabitants from 01.04.2017 to 30.03.2018. Group of interviewees comprised 1150 inhabitants of the Agglomeration; 52% were women, and 48% men, as well as 40 entrepreneurs. The most numerous group among inhabitants taking part in the survey comprised persons

aged 20–35 years (70%). Relatively numerous group there were also persons aged 36–50 (23%). Among interviewees 4% were persons aged more than 66 and 3% persons aged 51–65. Youths were not represented (persons aged less than 19).

Among enterprises of the Wałbrzych Agglomeration, which took part in surveys, nearly half of them represented the industry (49%), 24% services, 18% Small and Medium Enterprises (SMEs) and 9% trade (Fig. 1).

Among interviewees there dominated large companies hiring more than 250 persons (37%). Relatively serious group comprised micro-companies with 10 employees maximally (26%). Medium enterprises (number of employees up to 250) posed 21% and small ones (up to 50 employees) 16% – Fig. 2.

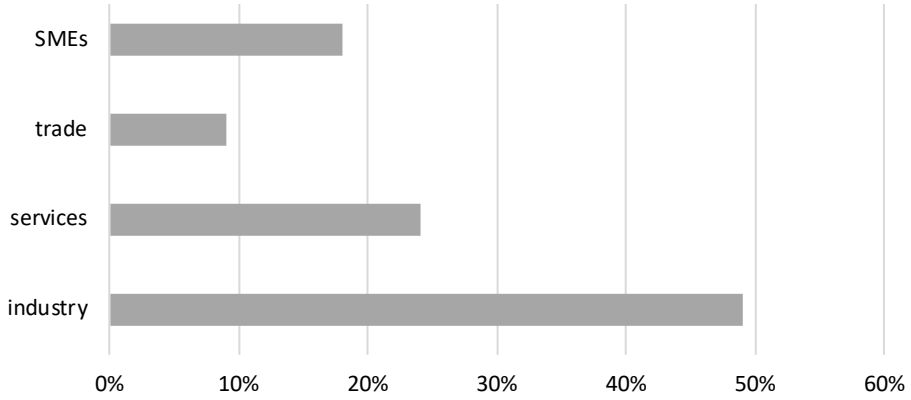

Figure 1. Structure of the WA enterprises that participated in surveys (2017–2018) due to the represented sector of economy
Source: own study (Detyna, Mroczek-Czetwertyńska, 2019).

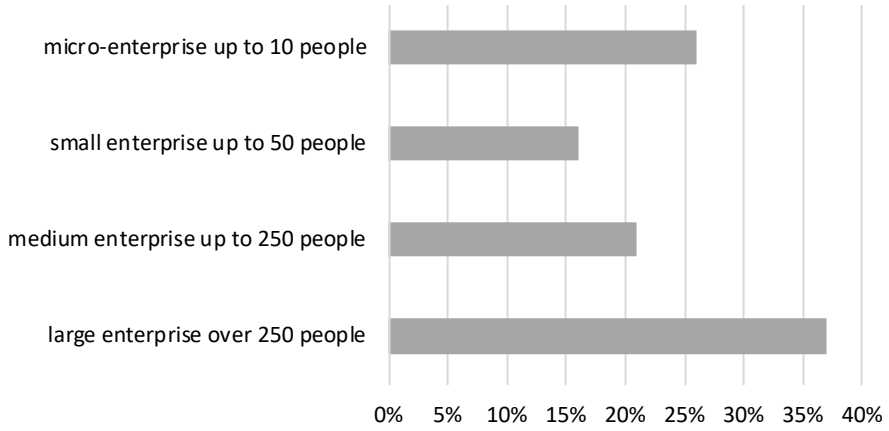

Figure 2. Structure of the WA enterprises that participated in surveys (2017–2018) due to the size of the enterprise
Source: own study (Detyna, Mroczek-Czetwertyńska, 2019).

Nearly half of interviewees confirmed international range the company's business (49%). Domestic (range) business was represented by 28% and regional by 23%.

Questionnaires were addressed to territorial self-government cells and filled out by employees of local self-government: city mayors, village mayors, their deputies, financial officers and secretaries – from 26.02.2018 to 31.03.2018. Half of communes taking part in the survey has a status of the urban commune (50%), 25% were rural&urban communes and remaining 25% – rural communes (Fig. 3).

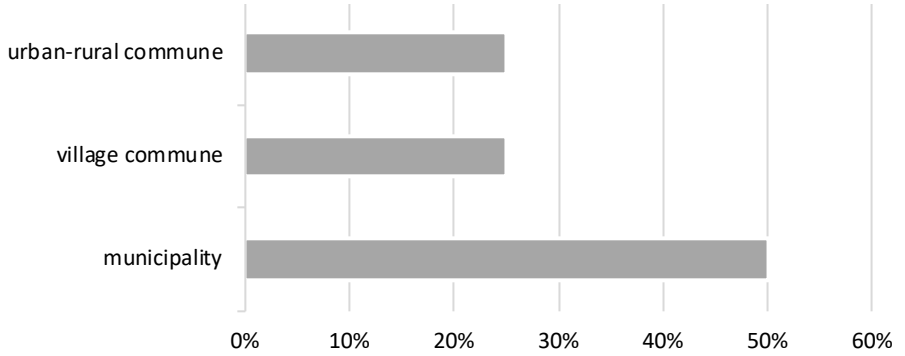

Figure 3. Status of the WA communes that participated in the survey (February-March 2018)
Source: own study (Detyna, Mroczek-Czetwertyńska, 2019).

4. Test results

Inhabitants, when assessing territorial self-government operations in terms of establishing advantageous conditions for investors, rated the self-governments – averagely 2.8 (rate scale 1–5). Distribution of interviewees' answers is presented in the Fig. 4. 1 is the lowest rate and 5 the highest one.

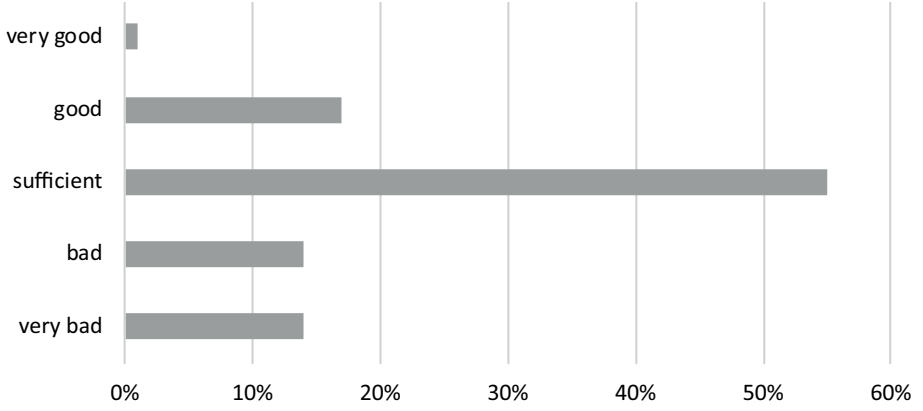

Figure 4. Evaluation of the activities of local government units in area of creating favorable conditions for investors – inhabitants' opinions (2017–2018)
Source: own study (Detyna, Mroczek-Czetwertyńska, 2019).

Among the most frequent remarks made by inhabitants regarding the economic potential of communes including the aid for investors provided by territorial self-government there were:

- number of investments in communes is too low, other incentives for investors are necessary,
- it is necessary to set up units responsible for present and potential investors,
- it is necessary to reduce tax loads for investors,
- it is especially necessary to support smaller investors,
- it is necessary to create catalog of companies in the Internet websites of communes,
- it is necessary to support entrepreneurs e.g. in form of advertisements,
- serious potential of WA are young persons who should be encouraged to stay in this area – e.g. customized programs, offers, incentives,
- it is necessary to enhance promotional actions in communes – not only in the nearest area,
- potential of the WA communes is great areas – old architecture, interesting history (e.g. mysterious basements built during the Second World War), mountains and forests (frequently this advantage is not used),
- the Agglomeration has a great tourist & culture potential – however, it requires dynamic actions intended to develop the infrastructure and proper advertisement,
- high tourist potential of the WA communes requires many investments into the road infrastructure; they will positively affect growth of Wałbrzych and the entire region as well,
- the WA communes should rely on the renewable energy since it will convert into economic potential of the area.

Conditions provided by WA communes for growth of the entrepreneurship were also rated by representatives of entrepreneurs. They postulated larger aid of the self-governments addressed for persons running economic operations. In opinion of most of entrepreneurs taking part in the survey, territorial self-government actions in terms of business promoting conditions are insufficient; as many as 66% of them rate the conditions bad and very bad. Positive opinions on efforts made by communes and intended to support the entrepreneurship were expressed totally by 41% of interviewees: in opinion of 25% of them actions of the self-governments should be rated averagely, and in opinion of 16% of them – good or very good.

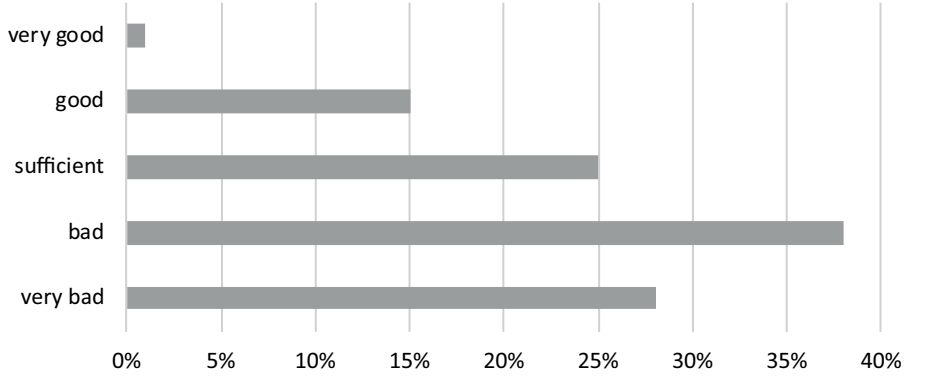

Figure 5. Evaluation of the activities of local government units in the creation of favorable conditions for investing in communes of the WA – opinions of entrepreneurs
Source: own study (Detyna, Mroczek-Czetwertyńska, 2019).

Among postulated aid for economic operations in the area of the WA communes, entrepreneurs taking part in the survey enumerated among others:

- conditions promoting free access to the market and competition (equal treatment of economic entities operating in a particular area),
- special economic programs for new investors including economic incentives,
- lower tax loads for entrepreneurs, in particular for those, who have just started their operation,
- specific financial instruments intended to realize new investments,
- pro-development operations in communes, among others, designed to develop the logistic infrastructure,
- assurance of developed areas for investments,
- educational operations addressed to persons interested in starting up and running own economic operation (e.g. trainings and courses),
- effective operations of the Regional Development Agency, business promotion centers or business incubators,
- actions promoting the communes themselves – their social and economic potential,
- informative operations by territorial self-government – they need to communicate with entrepreneurs, among others, in terms of strategic plans of communes and realization of pro-development investments,
- subordinating the current polity of communes to long-term plans, e.g. economic development strategies,
- maximal use of financial instruments which the communes have,
- capital expenses of communes in a social area, including the education system, living conditions and quality of life.

On the other hand, in opinion of self-government representatives, conditions provided by communes intended to promote the entrepreneurship should be rated well – averagely 3.66. In this case good and very good rates dominated (totally 92%), which is presented in the Fig. 6.

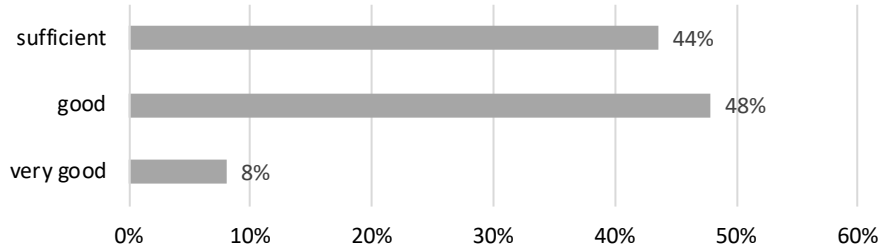

Figure 6. Evaluation of conditions for the development of entrepreneurship in WA communes – opinions of local government (2017–2018)
Source: own study (Detyna, Mroczek-Czetwertyńska, 2019).

5. Conclusions

Summing up the surveys it can be concluded that opinions of polled inhabitants, entrepreneurs and self-government representatives on the policy of the Wałbrzych Agglomeration in terms of aid for the entrepreneurship and new investments are very different. Sources of the differences are different needs and expectations of persons, who run the economic operation and persons, who are responsible for development of the entire commune. Certain goals do not coincide. However, in the light of surveys conducted by the authors, self-government cells are recommended to examine their operations and solutions dedicated to entrepreneurs (present and potential ones).

Polled WA inhabitants expect, among others: greater incentives for investors, appointment of specialized units in order to support the entrepreneurship and new investments, lower tax loads (especially for entities starting their business and small companies), as well as more extensive operations of communes in terms of promotion and advertising of the commune/region. At the same time, interviewees emphasize necessity of better use of economic potential of the WA. In particular, inhabitants appreciate tourist advantages of the region that is green areas, numerous old buildings and monuments, an interesting and intriguing history. Inhabitants expect also larger investments into the renewable energy; in their opinions it will translate into increased economic potential of particular communes and the entire Agglomeration (and such a situation may encourage new investors to do business in a particular area).

Similarly like inhabitants, also entrepreneurs enumerated tools which self-governments should use when developing a policy intended to support economic operations and innovative ones. This group expects, among others, greater activity of self-governments in terms of financial instruments addressed to entrepreneurs in order to support new investments. Persons, who run economic activity, appreciate also availability and accessibility of the logistic infrastructure including transport infrastructure. This infrastructure determines effectiveness and efficiency of realized processes (e.g. supply, manufacture, distribution).

Integral part of communes' policy in terms of support for business and new investments should be, in the authors' opinion, promotion of communes themselves meaning,

among others, informing recipients about offered products – e.g. tourist products or investments. Goal of such operations is, most of all, stimulation of a need to learn about offer of a particular commune and presentation of special advantages of the offer addressed to a potential investor (also inhabitant, a tourist). Nevertheless, when in context of a tourism promotional campaigns is, most of all, image of a commune and its advantages, in case of investors such actions are insufficient (however, they are important when it comes about interest in a particular commune, its location, history, local attractions etc.) Communes aware of necessity to commence promotional operations (in varied areas) must take up actions intended to attract clients, based on varied tools – adjusted to a potential recipient and a goal of promotion. Relevantly planned promotion is the first and the most frequent criterion deciding on interest in a particular commune (Altkorn, 2006; Legutko-Kobus, 2016; Detyna, Mroczek-Czetwertyńska, 2017; Detyna, 2018). Self-governments belonging to the AW perform promotional operations in two ways. From one hand they operate independently using funds from communes' budgets, from the other hand they are beneficiaries of promotional operations realized by the Agglomeration as well as by WSSE „INVEST PARK" cooperating actively and providing the communes with the aid in this extent.

Recommended actions in terms of promotion of the communes are, most of all:

— development and increase in services rendered by public organizations including JST,
— care for a good image of a commune and the region,
— increase in attractiveness of a commune (for varied groups of involved persons),
— improvement of the environment conditions,
— improvement of quality of the inhabitants' life,
— enhancement of the economic potential – by activation of the local society, educational actions, establishing an effective system of aid for the entrepreneurship and innovativeness at a particular area etc.
— protection and reviving values which play substantial role in the cultural identity (Szromnik, 2002; Obrębalski, 1998).

As a result of surveys conducted by the authors it can be concluded that actions taken by WA communes in order to support the entrepreneurship and innovative operations are insufficient in opinion of polled inhabitants. Hence, they require continuous adaptation and improving efforts. In authors' opinion such operations must be regular task of self-governments which, in extent of their pro-development policy, must follow rules of the sustainable development of the communes and the entire Wałbrzych Agglomeration. The economic growth must be oriented to the contemporary and next generations.

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Chapter 5

A NEW FINANCING SYSTEM FOR PUBLIC HEALTH INSTITUTIONS FROM HOSPITAL NETWORK IN POLAND. CALCULATION METHOD, SIMULATIONS, CONCLUSIONS AND RECOMMENDATIONS

Mariusz Kaszubowski [7]

1. Introduction

This paper analyze the method of financing the Basic Hospital Financial Security System and its impact on the medical institutions.

The motivation for this work was the fact of new Regulation of the Ministry of Health from 22 September 2017. New principles of financing healthcare services brought quite innovative solutions for polish conditions. Due to the lack of prior piloting in this matter, it generated huge uncertainty among hospital managers.

The conducted research refers to the fourth quarter of 2017 and the two half-years of 2018, the first three periods for calculating the Lump Sum in the Hospital Network. The first conclusions from the functioning of the new financing system were drawn on the basis of theoretical analysis and empirical evidences. Simulations were conducted on for a group of three hypothetical hospitals with different contract sizes and the degree of their realization. Empirical data were gathered from one of public hospitals in Pomeranian District of National Health Fund: Independent Public Specialistic Health Care Center in Lębork (IPSHCC Lębork).

The layout of this study is as follows. The first chapter presents the goals and assumptions of the discussed reform. The second chapter is entirely concerned with the analysis of the formulas and algorithms used for calculating the LS for the analyzed system. The third chapter is a case study based on data from hospital in Lębork. The fourth and last chapter is the conclusions and recommendations.

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2. Basic Hospital Financial Security System

2.1. Purpose and reasons for creating a Hospital Network

As you can read in the official message, "the main goal of creating a Hospital Network is to improve specialistic care for patients and provide better conditions for hospitals. The network will include hospitals that are particularly important for patients for providing access to health services. Their functioning and stability of financing must be ensured due to the health safety of patients" [Q&A, www.siecszpitali.mz.gov.pl]. The second important goal of the legislation was to optimize the number of hospital departments and organize the structure, which does not preclude merging many facilities into one entity.

Hospitals that meet the eligibility criteria have created the so-called Hospital Network (HN), which was the part of Basic Hospital Financial Security System (BHFSS). About 93% of all funds from which hospitalization is currently financed were allocated for functioning of this system. The remaining 7% were planned to be distributed as result of competition proceedings. Qualification of the hospital to the BHFSS should guarantee that the NHF will uphold a contract.

The BHFSS system was intended to be the main form of securing patients' access to healthcare services in the field of hospital activity including not only highly specialized services but also those in the field of drug programs, ambulatory care or night and holiday health care clinics.

To what extent, in fact, these goals will be achieved, it is possible to answer after a few years of functioning of the new system. Nevertheless, after the first three calculation periods (Q4 2017 and H1, H2 2018), the conclusions can be drawn.

2.2. Hospital network in the Pomeranian District of NHF

As a consequences of the reform, 25 medical institutions were qualified to the NH in the Pomeranian Voivodship. The detailed list is presented in Table 1 below.

Table 1

NH in Pomeranian District of NHF

No.	City	Full name of institution
1	Bytów	Szpital Powiatu Bytowskiego sp. z o.o.
2	Chojnice	Szpital Specjalistyczny im. J.K. Łukowicza
3	Człuchów	Samodzielny Publiczny Zakład Opieki Zdrowotnej Szpital im. Jana Parnasa
4	Gdańsk	7 Szpital Marynarki Wojennej z Przychodnią SPZOZ
5	Gdańsk	Copernicus Podmiot Leczniczy sp. z o.o.
6	Gdańsk	Pomorskie Centrum Toksykologii

continued tab 1.

7	Gdańsk	Samodzielny Publiczny Zakład Opieki Zdrowotnej MSWiA
8	Gdańsk	Szpital Dziecięcy Polanki sp. z o.o.
9	Gdańsk	Uniwersyteckie Centrum Kliniczne
10	Gdynia	Szpitale Pomorskie sp. z o.o.
11	Gdynia	Uniwersyteckie Centrum Medycyny Morskiej i Tropikalnej
12	Hel	115 Szpital Wojskowy z Przychodnią SPZOZ
13	Kartuzy	Powiatowe Centrum Zdrowia sp. z o.o. NZOZ im. Dr. A. Majkowskiego
14	Kościerzyna	Szpital Specjalistyczny w Kościerzynie sp. z o.o.
15	Kwidzyn	EMC Szpitale Szpital Zdrowie w Kwidzynie
16	Lębork	Samodzielny Publiczny Specjalistyczny Zespół Opieki Zdrowotnej Lębork
17	Malbork	Powiatowe Centrum Zdrowia sp. z o.o. w Malborku
18	Miastko	Szpital Miejski w Miastku sp. z o.o.
19	Prabuty	Szpital Specjalistyczny w Prabutach sp. z o.o.
20	Puck	Szpital Pucki sp. z o.o.
21	Słupsk	Wojewódzki Szpital Specjalistyczny im. Janusza Korczaka sp. z o.o.
22	Sopot	Wojewódzki Zespół Reumatologiczny im. dr Jadwigi Titz-Kosko
23	Starogard Gdański	Kociewskie Centrum Zdrowia sp. z o.o.
24	Sztum	Szpital Polski w Sztumie
25	Tczew	Szpitale Tczewskie S.A.

Source: own work based on NHF data.

The above group consists of ten hospitals of the first reference degree, four hospitals of the second and third reference degree, five national hospitals and two specialistic hospitals (pediatric and pulmonary).

3. Analysis of calculation method of the financing in HN

3.1. Calculation of the Lump Sum in the HN

The Lump Sum (LS) is calculated on the basis of the Regulation of the Ministry of Health from 22 September 2017 and come into effect on 1 October 2017. The method of its calculation is based on specific formulas. To fully understand the relations of factors determining the amount of the LS, it is important to define them clearly. Below is their detailed list:

A_l – basic number of reporting units calculated for healthcare provider *l*, in the planning period;

B_l^- – number of reporting units completed by the healthcare provider *l*, during the cal-

culation period, that were financed as part of a LS during the calculation period and at the same time will not be financed as part of a LS in the planning period due to a change in the qualification of the healthcare provider *l*;

B_l^+ – number of reporting units completed by the healthcare provider *l*, during the calculation period, that were not financed as part of a LS during the calculation period and they will be financed as part of a LS in the planning period, due to a change in the qualification of the healthcare provider *l*;

a_l, b_l – correction coefficients calculated for the healthcare provider *l*;

C_{i+1} – projected price of the reporting unit for the planning period specified in the plan;

C_0 – the price of the reporting unit in the first calculation period specified in the plan;

D_l – additional correction of the LS for the healthcare provider *l* for the planning period, increasing (positive value) or decreasing (negative value) the number of reporting units;

d – coefficient of the projected growth rate of financing health services in LS, for the planning period, specified in the plan;

I_l – corrected coefficient of change in the number of reporting units, calculated for healthcare provider *l*;

$J_{l,i+1}$ – corrected number of reporting units, calculated for healthcare provider *l*, for the planning period,

$J_{l,i}$ – corrected number of reporting units that was calculated for healthcare provider *l*, in the calculation period;

$K_{l,s,i+1}$ – correction factor corresponding to the services s, for the healthcare provider *l*, pursuant to art. 137 section 2 of the Act, for the planning period;

$K_{l,s,i}$ – correction factor corresponding to the services *s*, for the healthcare provider *l*, pursuant to art. 137 section 2 of the Act, during the calculation period;

k – time proportionality coefficient being the ratio of the length of the planning period to the length of the calculation period;

L_l – number of reporting units, reported by the healthcare provider *l*, in the calculation period, that will be financed as part of the LS for the planning period;

l – *l*-th healthcare provider in a district of the NHF ($l = 1,\ldots,n$), where n is the number of healthcare providers in a given voivodship.

ΔL_l – coefficient of change in the number of reporting units, calculated for the healthcare provider *l*;

N_l – over planned number of reporting units, calculated for the healthcare provider *l*, when $\Delta L_l > 1$. If $\Delta L_l \leq 1$, then $N_l = 0$;

N_l^+, N_l^- – values calculated for healthcare provider *l*, based on the formulas stated below, except that, they are not calculated if ΔL_l has a value between <0,98–1,0>;

ΔN – coefficient calculated in a given voivodship of the NHF, based on the formulas,

if for at least one healthcare provider l occurs $\Delta L_l < 0{,}98$ and for at least one healthcare provider l occurs $\Delta L_l > 1$; otherwise $\Delta N_l = 0$;

P_l – number of reporting units, calculated for the healthcare provider l;

Q_l – qualitative correction factor, calculated for the service provider l,

$q_{l,j}$ – correction coefficients related to the quality of the providing healthcare services, designated for healthcare provider l, in the planning period;

$R_{l,i+1}$ – LS value for healthcare provider l, in the planning period;

$R_{l,i}$ – LS value for the healthcare provider l, during the calculation period;

$R_{l,0}$ – LS value for the healthcare provider l, for the first period of the BHFSS, calculated on the basis of art. 5 paragraph 4 of the Act from 23 March 2017;

s – s-service from the set of healthcare services financed under the LS from 1 to m ($s = 1,\ldots, m$);

$S_{l,s}$ – number of services s, performed by the healthcare provider l, in the calculation period, that will be financed as part of the LS in the planning period;

$T_{s,i+1}$ – relative value corresponding to a given service s, expressed in points, regulated on the basis of art. 146 section 1 of the Act, in the planning period. If the given s service cannot be defined as an exact relative value, then the value for the s is stated as the closest do the given in medical terms;

$T_{s,i}$ – relative value corresponding to a given service s, expressed in points, regulated on the basis of art. 146 section 1 of the Act, during the calculation period. If the given s service cannot be defined as an exact relative value, then the value for the s is stated as the closest do the given in medical terms;

ΔT_l – coefficient of change in the value of relative services s, calculated for the healthcare provider l;

U_l – additional number of reporting units, calculated for the healthcare provider l.

Additionally, Figure 1 presents a diagram, helping to understand the periods names used for the calculations.

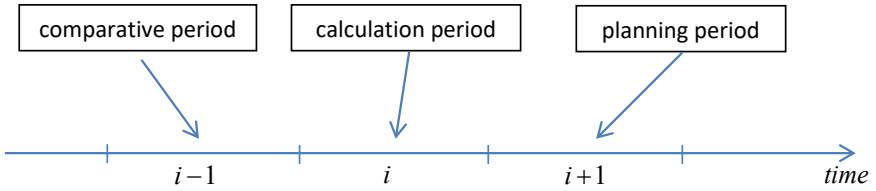

Figure 1. The periods names used in LS calculation
Source: own work.

The LS value for the healthcare provider l in the planning period is calculated on the basis of interrelated mathematical formulas. Figure 2 presents the full picture of these relationships.

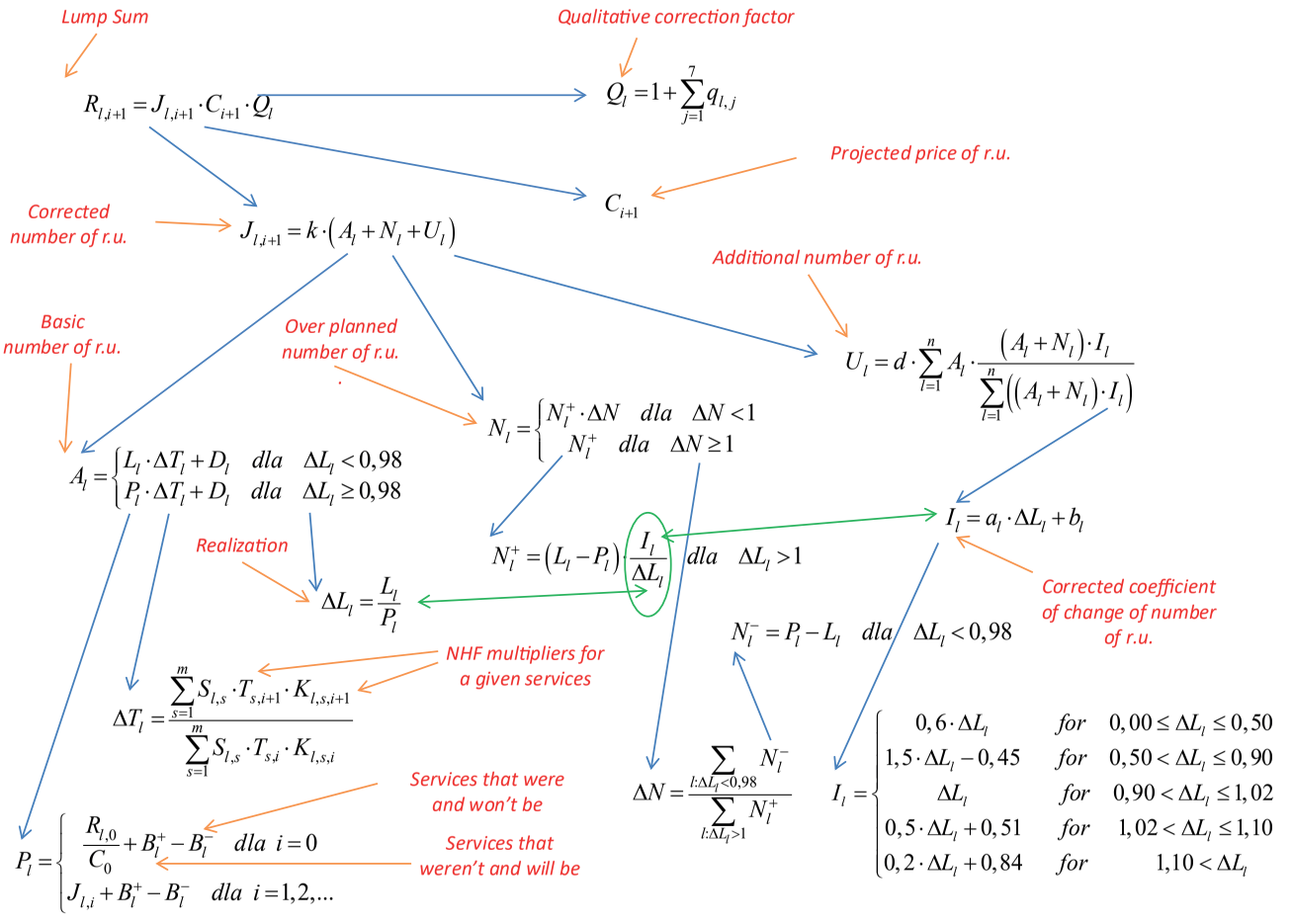

Figure 2. LS calculation scheme. *Source*: own work.

Significant impact affecting the size of the LS for the next period, when the health-care provider has so-called over planned realizations ($\Delta L > 1$), has another, degressive correction factor $\frac{I_l}{\Delta L_l}$. Its characteristics are well illustrated by the pattern below and Figure 3.

$$\frac{I_l}{\Delta L_l} = \begin{cases} 1 & for \quad 1,00 \le \Delta L_l \le 1,02 \\ 0,5 + \frac{0,51}{\Delta L_l} & for \quad 1,02 < \Delta L_l \le 1,10 \\ 0,2 + \frac{0,84}{\Delta L_l} & for \quad 1,10 < \Delta L_l \end{cases}$$

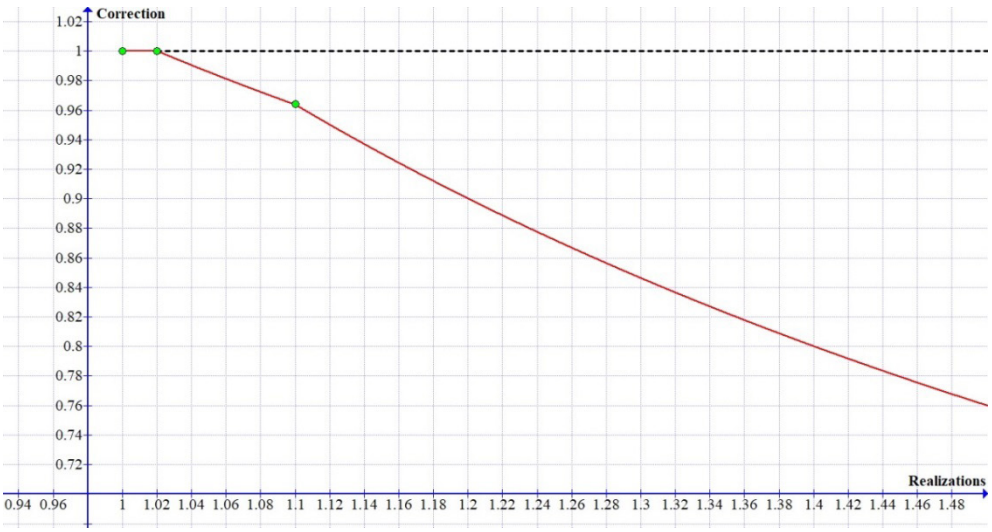

Figure 3. Degressive correction factor for over planned realizations $\Delta L > 1$
Source: own work.

No less important is the corrected coefficient of change in the number of reporting units I_l for determining the additional LS value in the case of an increase of expenditure on health services in a given voivodship NHF. Figure 4 presents the dependence of this coefficient on the degree of realization ΔL of a given healthcare provider.

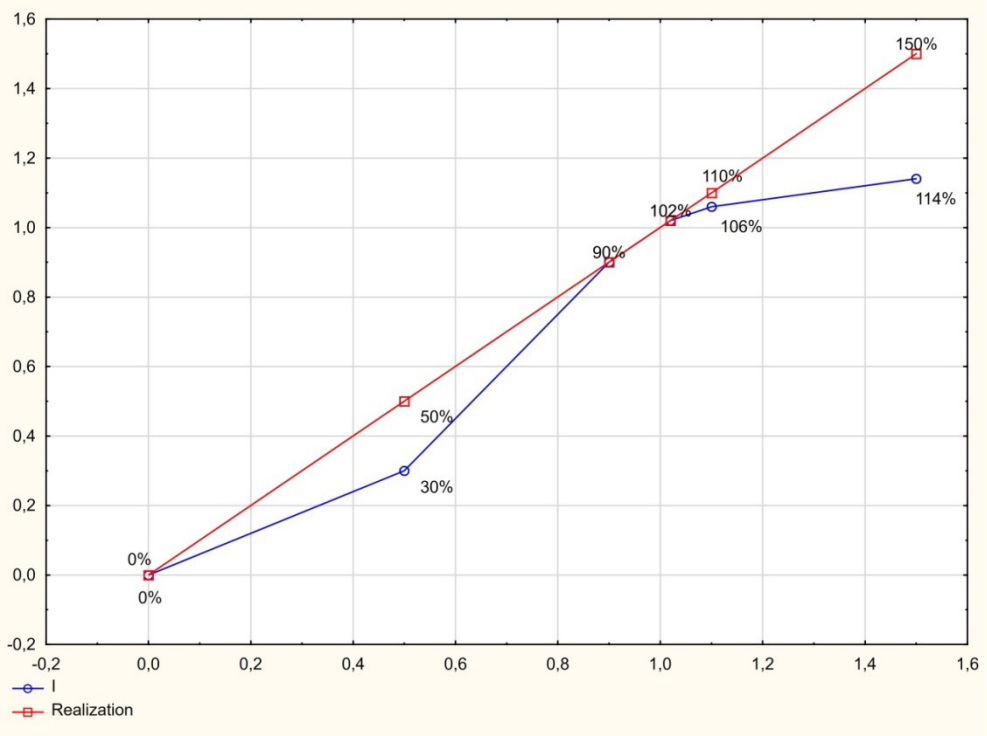

Figure 4. Corrected coefficient of change in the number of r.u. vs realizations
Source: own work.

The last important element determining the size of the discussed LS is the qualitative correction factor. Its value depends on the results of hospital accreditation, certificates for microbiological and analytical laboratories and the degree of performance of ambulatory hospital care. Detailed criteria for obtaining the values of this coefficient are presented in Table 1 below.

Table 1

Qualitative correction factor Q_l

j	Characteristic	$q_{i,j}$
Accreditation results[1]	At least 90% of all points	0.020
	At least 80% and less than 90% of all points	0.015
	At least 75% and less than 80% of all points	0.010
Certificate[2]	Central Quality Research in Microbiological Diagnostics gained by microbiological laboratory	0.005
	Central Quality Research in Laboratory Diagnostics gained by diagnostic laboratory	0.005

Amabulatory[3]	Increase in the number of reporting units in ambulatory care at least:	
	5% but less than 10%	0.010
	10% but less than 20%	0.0125
	20%	0.015
	Decrease in the number of reporting units in ambulatory care at least:	
	5% but less than 10%	–0.010
	10% but less than 20%	–0.0125
	20%	–0.015
	Reduction of the average waiting time for each ambulatory clinic financed in LS or increase in the number of people removed from the waiting list in each ambulatory clinic financed in LS, on the end of the calculation period in reference to the end of the comparative period at least:	
	10% – in the case of a healthcare provider which had an increase in the number of reporting units for ambulatory care by at least 10%	0.0025
	20% – in the case of a healthcare provider which had an increase in the number of reporting units for ambulatory care by at least 20%	0.005
Sum		Max 1.050

[1] Providing the certificate to the NHF, no later than by the end of the second month of the planning period;
[2] Providing the certificate to the NHF during calculation period, valid in the planning period;
[3] Changes relate to the calculation period, compared to the comparative period, while the data from the waiting lists provide only the groups with the medical category "stable case"

Source: own work based on BHFSS regulations.

4.1. Simulation of a LS in different variants

The design of calculating the Lump Sum in Hospital Network is extremely difficult due to the uncertainty of many factors. One of the most important is the coefficient determining the realization degree of a given healthcare provider during the calculation period (ΔL). Below are four simulations of the LS value for the hypothetical NHF district consisting of three healthcare providers: X large hospital with an annual contract of 100 million PLN, medium hospital Y with a contract of 50 million PLN and a small Z hospital with a contract of 10 million PLN. Each of these three, apart from the fact that they have different values of contracts, differ in the rates of realization of medical services. The following analysis assumptions were made to make the simulations comparable:

— projected price of the reporting unit $C_i = 1$,
— time proportionality coefficient $k = 1$,
— additional correction of the LS $D_l = 1$,
— additional number of r.u. realized, not included in LS but will later $B_l^+ = 0$,

— additional number of r.u. realized, included in LS but won't later $B_l^- = 0$,
— coefficient of change in the value of relative services $\Delta T_l = 1$,
— qualitative correction factor $Q_l = 1$,
— coefficient of the projected growth rate of financing health services in LS: pessimistic variant $d = 0\%$, optimistic variant $d = 10\%$.

Example 1

The largest hospital X has below planned realization (ΔL = 80%), middle one Y has just planned realization (ΔL = 100%) and the smallest hospital Z has over planned realization (ΔL = 120%).

Table 2

Simulation no 1

Hospital	Current LS	Realization ΔL_l [%]	New LS d=0%	Extra U_l d=10%	New LS + U_l d=10%
X	100 000 000	80%	80 000 000 (20.0% ↓)	6 843 512 (8.6% ↑)	86 843 512 (13.2% ↓)
Y	50 000 000	100%	50 000 000 (0.0% ↔)	5 702 926 (11.4% ↑)	55 702 926 (11.4% ↑)
Z	10 000 000	120%	11 800 000 (18.0% ↑)	1 453 562 (12.3% ↑)	13 253 562 (32.5% ↑)
Sum	160 000 000	89%	141 800 000 (11.4% ↓)	14 000 000 (9.9% ↑)	155 800 000 (2.6% ↓)

Source: own work.

From the table above, Hospital X loses a 20% of its previous LS and in the case of a 10% increase of projected growth rate, the National Health Fund transfer only 8.6% more compared to the already reduced LS. Hospital Y loses nothing and in the case of an additional funds, it receives relatively more, because about 11.4%. Hospital Z receives 90% refund of over planned realizations as well as in the case of an additional funds over 12.3% more in relation to the previous LS.

Example 2

The large hospital X has over planned realizations (ΔL = 120%), the middle size hospital Y has unchanged realization (ΔL = 100%) and the smallest one Z below planned realization (ΔL = 80%).

Table 3

Simulation no 2

Hospital	Current LS	Realization ΔL_l [%]	New LS d=0%	Extra U_l d=10%	New LS + U_l d=10%
X	100 000 000	120%	102 000 000 (2.0% ↑)	10 475 012 (10.3% ↑)	112 475 012 (12.5% ↑)
Y	50 000 000	100%	50 000 000 (0.0% ↔)	4 754 454 (9.5% ↑)	54 754 454 (9.5% ↑)
Z	10 000 000	80%	8 000 000 (20.0% ↓)	570 534 (7.1% ↑)	8 570 534 (14.3% ↓)
Sum	160 000 000	111%	160 000 000 (0.0% ↔)	15 800 000 (9.9% ↑)	175 800 000 (9.9% ↑)

Source: own work.

Hospital X incur great losses because it receives only 10% of over planned realizations. Financial support might be is the increase of the projected growth rate. Hospital Y is in the best situation. The Z hospital not only loses 20% of the LS value, but also in the case of additional financing (d = 10%) it gets less than the projected growth rate, because only about 7% (double punishment).

Example 3

The large hospital X and the smallest Z have both below planned realization (ΔL = 80%) and hospital Y unchanged realizations (ΔL = 100%).

Table 4

Simulation no 3

Hospital	Current LS	Realization ΔL_l [%]	New LS d=0%	Extra U_l d=10%	New LS + U_l d=10%
X	100 000 000	80%	80 000 000 (20.0% ↓)	8 000 000 (10.0% ↑)	88 000 000 (12.0% ↓)
Y	50 000 000	100%	50 000 000 (0.0% ↔)	6 666 667 (13.3% ↑)	56 666 667 (13.3% ↑)
Z	10 000 000	80%	8 000 000 (20.0% ↓)	800 000 (10.0% ↑)	8 800 000 (12.0% ↓)
Sum	160 000 000	86%	138 000 000 (13.7% ↓)	15 466 666 (11.2% ↑)	153 466 667 (4.1% ↓)

Source: own work.

Hospital X like Z loses LS proportionally to realizations and gets the same proportion in the case of increased projected growth rate. Again, hospital Y is in the best position because do not lose anything and in the case of 10% projected growth rate it gets more than 13% increase of LS.

Example 4

The largest X and smallest Z hospitals have over planned realizations ($\Delta L = 120\%$). The middle one Y has again unchanged realizations ($\Delta L = 100\%$).

Table 5

Simulation no 4

Hospital	Current LS	Realization ΔL_l [%]	New LS d=0%	Extra U_l d=10%	New LS + U_l d=10%
X	100 000 000	120%	100 000 000 (0.0% ↔)	10 000 000 (10.0% ↑)	110 000 000 (10.0% ↑)
Y	50 000 000	100%	50 000 000 (0.0% ↔)	4 629 630 (9.3% ↑)	54 629 630 (9.3% ↑)
Z	10 000 000	120%	10 000 000 (0.0% ↔)	1 000 000 (10.0% ↑)	11 000 000 (10.0% ↓)
Sum	160 000 000	114%	160 000 000 (0.0% ↔)	15 629 630 (9.8% ↑)	175 629 630 (9.8% ↑)

Source: own work.

Hospital X and Z receive no compensation for over planned realizations and in case of a 10% increase of projected growth rate both hospitals receive proportional value of LS. Hospital Y does not incur losses and also receives a similar increase in benefits as other hospitals in the case of an additional financing.

In fact, according to NHF data, after first period of Basic Hospital Financial Security System, there were noticed:

— 24 hospitals with realizations below 90%,
— 110 hospitals with realization in the range from 90% to 100%,
— 446 hospitals with realization in the range of 100%–110%,
— 10 hospitals above 110%.

4. Case of Independent Public Specialistic Health Care Center in Lębork

4.1. Characteristics of the IPSHCC Lębork

The value of the LS in the BHFSS and the calculation method were analyzed on the basis of information from the Independent Public Specialized Health Care Center in Lębork. This hospital had the following departments:

- Anesthesiology and Intensive Care,
- General Surgery,
- Internal Medicine,
- Cardiology,
- Orthopedics,
- Pediatrics,
- Gynecology and Obstetrics,
- Geriatric,
- Hospital Emergency,
- Psychiatric.

Additionally, the following clinics and objects functioning at the hospital:

- Allergic,
- General Surgery,
- Diabetic,
- Neonatological,
- Oncological,
- Orthopedic,
- Gynecological,
- Speech Therapy,
- Primary healthcare,
- Physiotherapy,
- Endoscopy Laboratory,
- Analytical and Microbiological Laboratory,
- Pathomorphology,
- Medical Imaging.

The following departments were financed as part of the LS: Anesthesiology and Intensive Care, General Surgery, Internal Medicine, Cardiology, Orthopedics, Pediatrics and Gynecology.

The structure of hospital income presents the chart below.

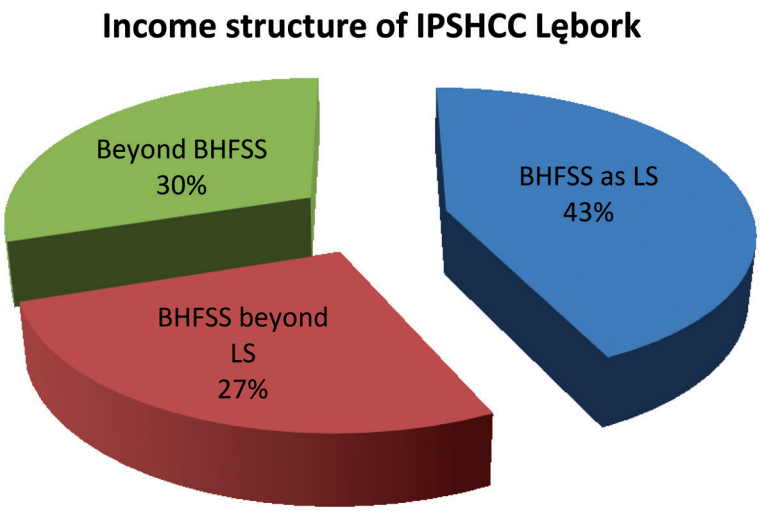

Figure 5. Oncome structure of Independent Public Specialistic Health Care Center in Lębork
Source: own work.

4.2. Healthcare realizations in LS over a time

The value of LS calculated for the planning period mostly depend on the degree of healthcare realizations from of a previous, calculated period. That is why, the size of the LS in the second financing period (H1 2018) was designated by the value of LS in the period (Q4 2017).

In case of IPSHCC Lębork, global healthcare realization in the fourth quarter of 2017 was significantly lower because of staff problems at Internal Medicine and Gynecological Departments. The reason for this was that several specialist, doctors terminated their contracts. This situation was difficult to predict. Coincidence of other factor as the short time (one quarter) for adaptation to return to the situation before the "crisis" finally caused that the LS for the next period (H1 2018) was significantly reduced. The next two figures below (Fig. 6 and Fig. 7) show the change in the volume of quarterly realizations during 2015–2018. Despite a significant return to the previous level of realizations, the LS in the last period is much lower and there is no guarantee that the over planned realizations from calculating period will be return in increase of funding in the next planning period.

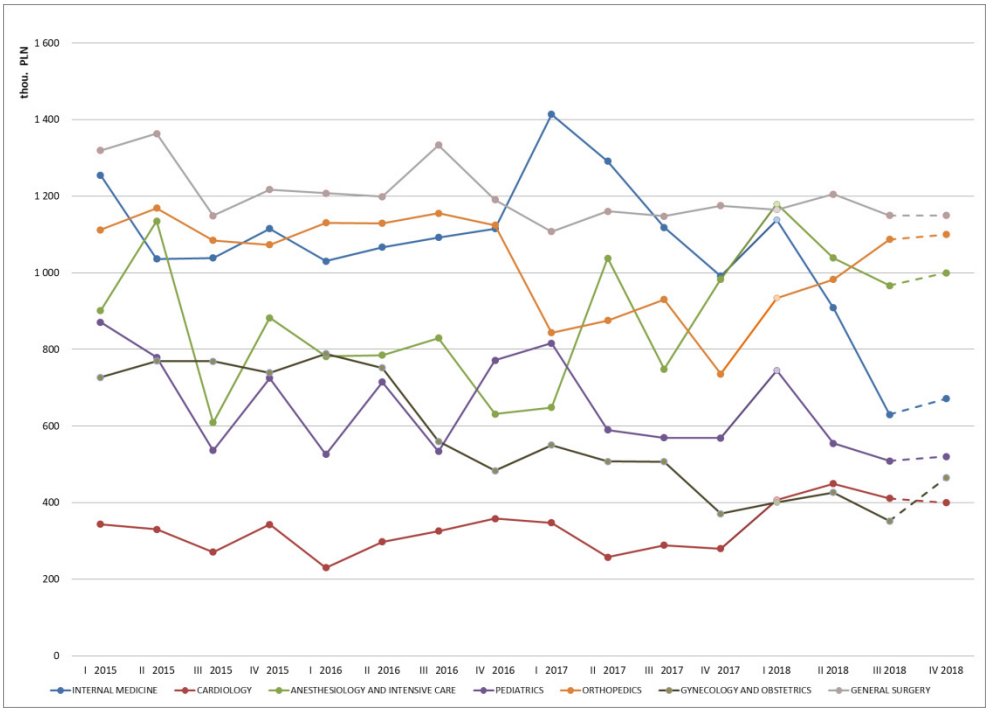

Figure 6. Healthcare realizations in departments of Lębork hospital that are financed by LS in quarters of 2015–2018
Source: own work.

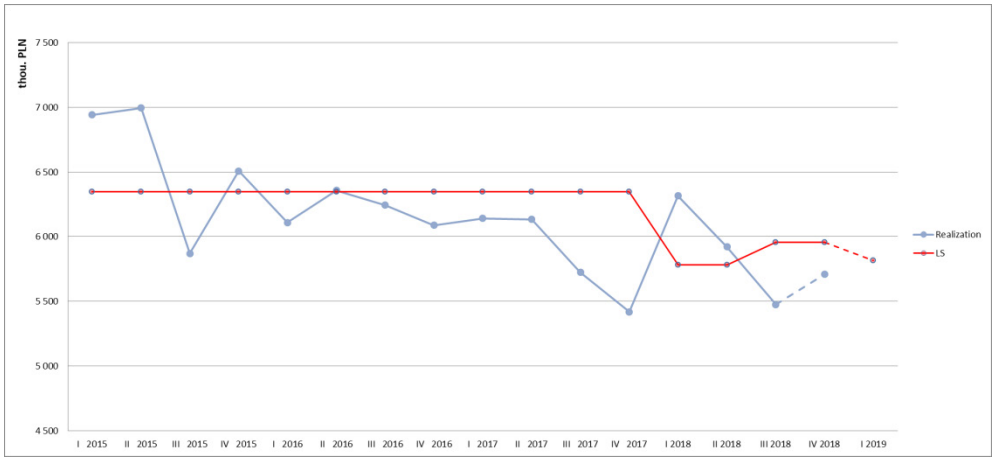

Figure 7. Total healthcare realizations vs calculated LS in Lębork hospital in the quarters of 2015–2018
Source: own work.

5. Conclusions and recommendations

5.1. Conclusions

— The described LS significantly reduces the "temptation" of over planned healthcare realizations due to degressive correction factors and uncertainty about the results of other hospitals in the given district of the National Health Fund.
— In the case of unexpected realizations below the limit, a lost gap of the LS is impossible to work out in short time (few years) despite the back to the previous abilities.
— Projecting the LS on a base of one quarter of the years is not justified, because it does not take into account seasonality as well as does not give a chance for adaptation in the case of unwanted situations having a significant impact on realizations level (an excellent example is IPSHCC Lębork).
— Optimization will force to artificially maintain the status quo of realization at 98%–100% level, which will not be a real representation of region health demands and real potential of given hospital.
— Use of short periods for calculating the LS does not take into account the inertness of healthcare realizations. It is not possible to reduce or increase in fast and controlled way the degree of medical healthcare realizations. This is because of employee contracts or planned operations and treatments.
— Reducing healthcare services including life-saving procedures (i.e. Intensive Therapy) will result in increase of costs for patients migration as well as in the higher risk of their mortality.
— LS does not solve the problems associated with higher unit costs in the small hospitals comparing to large.
— The LS calculation rules allow flexible change of limits of healthcare realizations in departments within given hospital. In case of problems with realizations in a one ward, the hospital can increase or reduce medical services on others, leveling the differences. Unfortunately, the smaller hospital, the greater interference is required.
— There is no reason to applicate double "punishment" for over and below planned realizations hospitals when the additional funds are allocated ($d > 0$).
— Finally, LS is generating unhealthy competition between hospitals in the same district. Problems of one hospital results in financial benefit of another's.

5.2. Recommendations

— When the reforms of financing healthcare services on a large scale is planned, there should be pilotage. In this case, there was no trial. Thus, absolutely necessary, the first calculating period should be at least one year, not a three months.
— From economic point of view, the correction factor which purpose is to bring in the degressive scale, should be descending nut not convex function, rather concave function (according to the diminishing returns rule).
— Punishing several times for over or below planned realizations should not take place.

The LS formulas use degressive scale in all three components: basic number of reporting units (A_l), over planned number of reporting units (N_l) and additional number of reporting units (U_l).

— There should be similar degressive scale for hospitals with over or below planned realizations.
— The formula for LS should be simplified into the function of two components: region healthcare demands and hospitals potential.
— Appropriate equivalence scales of LS should be set for, separately, small hospitals (I reference level) and huge hospitals (II and III reference levels).

Bibliography

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