

Practices of Technology Parks Supporting Innovative Activities: Evidence from Poland

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The aim of the paper is to reveal the role of technology parks (TP) in the creation of new businesses and the expansion of existing ones. This issue is part of a study aimed at finding an answer to the question of whether there is a link between the creation of new businesses and the development of existing ones, and regional environment factors. The analysis is carried out through the identification of activity of TPs functioning in Poland. The results of the study may also be the starting point for the diagnosis on behaviours of TPs as environmental factors in a specific region and an indication of the desired directions of its changes. The subject undertaken by us draws attention to the fact that the management of existing competences and creating new ones could allow TPs to compete outside of their current arenas of competition.

Key Words: Technology Parks, entrepreneurship, innovation, innovative activities

JEL Classification: L53, M13, O32

Introduction

The added value of Science and Technology Parks (STP) for tenants is analyzed by many scientists (Löfsten and Lindelöf 2002; Yang, Motohashi, and Chen 2009). Current studies investigate the innovativeness of new technology-based firms located in science parks (Hartung and MacPherson 2000; Nieto and L. Santamaria 2007; Yang, Motohashi, and Chen 2009) and overall performance (e.g. Sampson 2007).

Our studies fit in with this trend. We identify the role of TP in supporting the creation and development of enterprises implementing innovations and innovativeness of companies located in Technology Parks (TP) in Poland.

Identification of the role of TP in the process of generating new ideas and transforming them into new products (services) is becoming cru-

cial for the development of enterprises (Pelagidis 2008). Generating and implementing innovations introduce disorders in the enterprise. Here, the field for TP activity as accelerators of innovation barriers opens up (Musyck and Reid 2010).

Barriers of innovativeness of organizations are defined as factors delaying, transforming or inhibiting the process of generating and/or implementing innovation (Mirow, Hoelzle, and Gemuenden 2008) Barriers of innovativeness are factors that have a negative impact on the course of the innovation process (Sandberg and Aarikka-Stenroos 2014). Thanks to the wide offer, the parks should be successfully neutralizing these barriers. To do this, on the one hand, a well-prepared offer of support from parks is needed, addressed at enterprises implementing innovations (Durão et al. 2005). On the other hand, enterprises willing and able to properly implement the support offered by parks.

Identification of the role of TP is associated with determining not only similarities, but also differences in the activities of TP in Poland addressed to companies implementing new technologies. A sign of the proactive role of TP in Poland includes the widening offers of TP ahead of the present needs and expectations of current businesses (TP tenants) implementing innovations. Strength of our study, compared to previous ones, is unveiling externally unobservable strategic goals of TP managers. This is despite the fact that all TPs in the study are managed parks, affiliated with a university or a research centre, are subject to the same laws and regulations, and benefit from the same fiscal supports.

Study Methodology

In order to obtain a wider context of the studied phenomena and be able to confront the data collected, triangulation of study methods was used (desk research was combined with a free-form interview). The examination of documents included, among others, reports, offers of TP operating in Poland and related institutions. Report on companies operating in technology parks and incubators in Poland in 2013, the offer of TPs operating in Poland and related institutions. The data presented in tables and charts was collected by Association of Organizers of Innovation and Entrepreneurship in Poland. Some of the data used is generally available in the database of this association, but some of it can be obtained only through TP managers. However, the method of using this data and conclusions made on its basis is a contribution of this article's authors.

The entities of the study were TP in Poland. There were 42 Technol-

ogy Parks in Poland in 2013. An analysis of reports and offers of TP for the year 2013 enables the identification of the innovativeness of companies located in TP and similarities of TP activities in Poland. Applying only methods of examining documents was insufficient, because the use of this method did not allow identifying the factors that distinguish parks from each other. The realization of this goal required this article's authors to carry out free interviews with four managers of technology parks in Poland (May–June 2014). A significant limitation of free-form interviews is that conclusions cannot be generalized to the population of TP in Poland. The role of TP is determined by identifying the scope of their activities. The studies assume that the meaning of the existence of parks is based on the aptly formulated offer of services and infrastructure. A practical expression of accuracy of TP offers is the ability to treat them (the offers) as tools for supporting the creation of new and development of existing enterprises implementing new products and technologies. (In)accuracy of offers of Technology Parks was assessed based on the identification of the degree of use of individual components of TP offers by companies operating in parks and beyond. Due to the high usefulness of this data, they are used, among others, by managers of parks to reconfigure the offers. However, the publication will present aggregated data. In contrast, the innovation of enterprises – TP tenants in Poland was established based on reports and other documents that show the structure of these companies and the range of services which they used in 2013.

Technology Parks in the Role of Enterprise Innovation Accelerators

The International Association of Science Parks (IASP) defines TP as an organization managed by specialized professionals, whose main aim is to increase the wealth of their community by promoting the culture of innovation and the competitiveness of associated businesses and knowledge-based institutions (Almeida, Santos, and Silva 2008; Cantu 2010; Closs et al. 2012). Such a definition is unique considering the references to research and technology parks.

Therefore, the main objective of the parks is to support the creation and development of knowledge-based enterprises (Vásquez-Urriago et al. 2014). Firstly, it was decided to recognize their declared and actual activity.

The range of services offered by Technology Parks in Poland is closely linked to the functions that they have to fulfil. These functions can be

divided into primary and secondary. In the course of their primary functions, TP:

- Support undertaking business activity based on new technological and organizational solutions, especially in the area of services. This function is performed through the assessment of: the market potential of new projects, added value brought by the park for the developmental potential of the project and management competencies of people undertaking business activity. This feature also includes support for the development of enterprises through specialist services tailored to the needs of enterprises.
- Advice in the scope of: establishing and registering the company, business plan and financing sources. This is a stage when the parks choose, among others, new companies that meet the criteria for entering the park. Moreover, parks offer advice in the scope of innovative project management, technology transfer, intellectual property rights protection, marketing, market research and export.
- Establish relationships with other organizations at the regional, national and European level.
- Rent office, laboratory and production space.
- Run investor service and sales offices of land real estate for technology enterprises within the managed investment areas.

On the other hand, in the course of additional functions, TP:

- Activate entrepreneurial attitudes in the academic environment. Since academic entrepreneurship (academics, alumni and students) can be an important source of projects in the incubator. This function is carried out in cooperation with academic incubators of entrepreneurship.
- Support the transfer of technologies from universities and scientific and research entities, as well as enterprises – especially the large ones.
- Conduct training activities in the scope of undertaking business activity, management and financing of technology ventures, technology transfer. In carrying out this function, parks primarily work with universities and financial institutions.

The scope of these functions is determined by the specialization of parks set out at the moment of their creation. Because by assumption they are profiled parks. Fulfilling the above functions by parks requires

TABLE 1 Components of the Technical Potential of Technology Parks in Poland

Components of the technical potential of TP in Poland		(1)
<i>Technical infrastructure</i>		
Databases		53%
Broadband Internet		92%
Wireless Internet		92%
Library/ reading room		25%
Teleconferencing equipment		61%
Specialist software		73%
<i>Infrastructural potential (rentable space)</i>		
Usable space of buildings at the disposal of technology parks in total (m ²)	373,654	
Office space for own needs (m ²)	22,001	
Rentable usable space (m ²)	154,490	
Own laboratory space (m ²)	14,090	
Rentable laboratory space (m ²)	20,383	
Classrooms / seminar rooms (number)	129	
Conference rooms (number)	92	
Computer labs (number)	18	

NOTES (1) TP having the component. Based on data from the database of Stowarzyszenie Organizatorów Innowacji i Przedsiębiorczości (Association of Organizers of Innovation and Entrepreneurship) in Poland.

the ownership of property, infrastructure and a suitably composed offer of services. An overview of the resources owned by parks, which may be relevant for the realization of both the primary and additional functions, has been shown in table 1.

The data contained in table 1 reveal that TP have adequate technical and infrastructural potential to the declared functions. TP can offer services related to real estate (e.g. renting offices, conference centres, production halls, office space, and laboratory space). Therefore, carefully selected components of technical and infrastructural potential can be an effective tool for supporting enterprises implementing innovations.

In the identification of the importance of real estate and infrastructure in supporting the innovativeness of enterprises, interviews with TP managers in Poland were used. These interviews allowed getting to know their views on the importance of TP resource potential.

From the statements of manager 1, it can be concluded that the im-

portance of real estate and infrastructure in fulfilling the functions performed by TP is immense:

The construction and development of the Technology Park was and is to create a multi-functional area of economic activity, aimed to support innovative ideas – start-up, but not forgetting mature companies. The Park's offer is comprehensive and allows a sole proprietorship company to transform into a large international company. The park provides the right office or laboratory infrastructure, and a package of services at every stage of the company's operation.

According to manager 1, this very high usability of real estate and infrastructure of technology parks is conducive to expanding the customer base of the park:

We are currently conducting technology audits, we conduct brokering of own laboratory services and other laboratories operating in the Park. We systematically conduct networking of the science and business world. At the request of companies we perform chemical research, noise level measurements, and a number of other studies that are in demand on the market.

This statement proves that the offers of parks in Poland are not dedicated exclusively to enterprises – tenants of technology parks, but also companies from outside the park. His statement demonstrates a growing interest in research, which is another argument for the legitimacy of creating such parks in Poland. Moreover, he notes (manager 1) that conducting studies in park laboratories relieves the company of expenses. Companies do not have to allocate scarce resources to build their own laboratories and employ highly qualified personnel. The use of such services is positive for the enterprises, because access to external sources of knowledge enhances the ability of enterprises to effectively and efficiently use this knowledge to develop new processes and products.

Such an offer of the park relieves the enterprise of maintaining extensive R&D facilities in the enterprises. Everyone has their own [laboratory]? In my opinion, this puts into question the viability of continuous investments on the side of enterprises. If we have an accredited laboratory, then the companies do not have to build their own laboratories. Conducting studies in small and medium-sized enterprises is difficult for several reasons, the most important being the lack of infrastructure and qualified staff.

Manager 2 explains that adequate infrastructure is the basis of the activity of each of the parks. He also recognizes that even in this area parks can differ from one another:

The basic offer of a technology park is access to modern infrastructure, and there can never be too much of this. [...] The foundation is infrastructure, but even here we differ; one has only offices, another has production infrastructure, yet another powerful server rooms.

The above is an argument that managers use the parks' resources for their intended purpose, presenting their offer to companies outside the parks, i.e. not being their tenants. TP are also active in other fields. The high usability of the infrastructure and offer of parks, as well as the involvement of TP employees in supporting the activities of entrepreneurs in the region is confirmed by the statement of manager 3.

I wouldn't want to speak for all my park colleagues in this matter. But I know what we're doing. In our park we care about the environment, water management and promote the widely understood wood industry (furniture). So, we make sure to constantly keep in touch with entrepreneurs involved in a given specialty in the region, we help them in mutual networking, in counselling and monitoring.

The benefits of such activity of TPs are mutual. On the one hand, the company benefits (tenant of the park). On the other hand, the park gathers knowledge of the real needs of these enterprises, which may be useful in reconfiguring the park's offer.

In another one of the parks, expanding the service offer with services that support *rebranding* proved an extremely effective choice, for both the parks and the businesses. The application of these services in practice has meant that businesses can separate themselves from certain stereotypes and connotations that have clung to them. In this way, the businesses could directly inform customers about changes taking place within the company, better standard of services or products. Manager 4:

This was the case e.g. with rebranding services, or marketing and technological audits. We were the ones to persuade our tenants that they need these types of services, and through their implementation, they will offer their customers better products.

Today, the expectations of tenants towards parks are growing. Therefore, in order to extend the circle of tenants outside the infrastructure, parks add pro-innovation services to their offer. These services can be

dedicated to the park's tenants, as well as companies outside the park. These services are characterized by the following features:

- dominance of immaterial elements,
- difficulty with clearly identifying the requirements related to the service,
- diverse nature and complexity of problems to solve, forcing an individual character and scope of each service,
- difficulty of precise planning of services in terms of specificity, the required technical, personnel and financial resources, as well as time of realization,
- difficulty in coordinating implementation measures, resulting from their diversity and the diversity of contractors,
- frequently appearing limits in the usefulness of experience with previous actions and projects.

These features set a number of requirements before the parks implementing them, which include:

- individualized approach to each of the problems addressed and services offered,
- the need for comprehensive preparation of each task and service,
- careful selection of the team of contractors, compliance with accepted orders and offered services,
- key importance of creativity and flexibility of activities, which involves the necessity of continuous learning by each TP employee,
- the need for careful monitoring of the implementation of activities, as well as the analysis and evaluation of their results, facilitating the accumulation of experience, improving activities and selecting new courses of action.

Therefore, TP are also active in other fields. Full support for enterprises from technology parks covers a wide range of consulting services. The data provided in table 2 show that the offer of parks in a certain scope of pro-innovative services is similar. This is an argument to claim that parks are a multifunctional area of economic activity, which is created for companies interested in implementing innovations and new technologies. For example, every second TP offers assistance in establishing contact with the technology supplier or recipient, it also offers consultations and the selection of innovative ideas. On the other hand, every third TP offers consultancy in the scope of the protection of intellectual property

TABLE 2 Pro-Innovative Services Offered in Technology Parks in Poland in 2013

Type of services	(1)
Assistance in establishing contact with the supplier or recipient of technology	50
Consultation and selection of innovative ideas	44
Preparation of offer or inquiries about technology	36
Consultancy in the scope of the protection of intellectual property rights for companies	33
Cooperative mediation abroad – internationalization	36
Market analyses and determining the market potential and technical possibilities of developing an idea	36
Advisory assistance in implementing technologies	28
Technology audit	28
Developing a plan for the implementation of innovative solutions	28
Assistance in the development of a prototype solution, product, or goods ready for testing	22
Assistance during negotiation and conclusion of agreement between the technology recipient and supplier	22
Searching for specific technologies on order of companies,	17
Monitoring the implementation of technologies or realization of agreement	14
Assessment and evaluation of technologies on order of companies	14
Defining the subject of transfer	11
Market tests of prototypes of products/services	6
Certification of solutions/technologies/products	3

NOTES (1) Parks offering the given type of services (%). Based on data from the database of Stowarzyszenie Organizatorów Innowacji i Przedsiębiorczości (Association of Organizers of Innovation and Entrepreneurship) in Poland.

rights for companies, market analyses and determining the market potential and technical possibilities of developing an idea and advisory assistance in implementing technologies. Even this kind of service offered by most parks in Poland may neutralize some barriers of innovativeness of enterprises, among others:

- problems related to communication and cooperation with internal partners. Lack of information necessary for the implementation of innovative projects,
- problems related to communication and cooperation with external partners in the process of generating and/or implementing innovations,

- unwarranted interruptions in the realization of innovative projects,
- problems with the purpose of the right amount of time, i.e. as much as is necessary, e.g. for market tests of prototypes of products/services, or the development of a prototype solution, product, or goods ready for testing.

The highly homogeneous structure of offers of TP in Poland intrigued to seek answers to the following questions:

- Are similar or different offers of parks more favourable for enterprises and the parks themselves?
- What are managers guided by when reconfiguring the parks' offers?

The undertaken problem of reconfiguring offers of parks is important, because the scope of the offers determines the future structure of enterprises – TP tenants, i.e. the specificity of each of the parks.

From the opinion of manager 3, we learn that the parks' offers are similar:

Yes. The foundations, framework of operation of the Parks should be similar. However, the detailed and dedicated offer should be different in each park. This is what specialization consists in. [...] The offer is very much like what you see, among others, in the area of Eastern Poland. A large part of the parks proposes incubation services and areas for production. Only some of the parks are specialized to support a particular industry. Over time, the choice of smart specialization will probably force this process. One cannot say that the offer is identical, but it is similar. [...] In my opinion, one should remember about specialization already in the basic offer, if such specialization occurs in a given region.

The high similarity of offers is also reflected in the statement of manager 2:

The basic offer is support in setting up the business, obtaining financing, realization of projects at the interface science-business, and of course the availability of infrastructure on preferential terms. [...] The offer of parks in Poland may not be identical, but it is still based on identical parts, e.g. in the form of real estate services, namely offering offices, laboratories in the general sense or production halls. Also, parts of the business services in the parks are the same. However, a number of prodevelopmental services or specialized laboratories are adapted to the profile of tenants and businesses in the region.

Additionally, the statements of manager 1 tell us about the need to distinguish the parks from one another. He also identifies the type of service that could play this role:

I think the basic offer should be similar, but not identical, for parks operating in Poland. It is important to stand out in advanced, highly specialized services. Technology parks must specialize. Professionalization results in benefits for both the parks and for their tenants and other service recipients.

Similar statements were made by manager 4:

I think it (the offer) is very similar. One cannot really talk about major differences here. [...] The key to specialization seem to be highly specialized services such as research for industry in the field of chemistry, computer science, physics or industrial design.

The statements of these managers allow one to determine the scope of the additional offer and, by analogy, the range of services that would form the basic offer. In addition, manager 1 emphasizes that the evolution from a universal park to a specialist one requires time, because the park must accumulate expertise and experience:

Expertise is a brand one works for years. It would be model to create highly specialized parks in Poland, where the sum of offers provides a full range of services for which there is market demand. They would create a kind of Hub – a coherent ecosystem of services at a high level. I think we should move in this direction in development of Parks in Poland.

These observations of the managers indicate the differentiation of the range of offers of parks, as a way to achieve competitive advantage of a specific park against other parks. In some parks, actions are currently already being undertaken to build a unique offer that allows the particular park to stand out against the background of offers of other parks in Poland. This is confirmed by the statement of manager 1:

The Technology Park stands out against the background of business environment institutions in the macro region in that it owns an own-managed accredited research laboratory. We specialize in the study of water, fluids (e.g. beer), wastewater, we conduct research and development works in the field of energy recovery from municipal waste (pyrolysis). We cooperate with law enforcement agencies in identifying the causes of environmental disasters. In the coming

years, we intend to successfully obtain financing for the development of laboratory services, and on this basis to build our competitive advantage in Poland and Europe.

Similarly, the statement of manager 4 shows that proactive reconfiguration of offers is in progress:

Awareness of many companies is limited to making money from the sale of products and services available here and now. Our innovative research services are often not seen as a source of building competitive advantages. We recognize this problem and are undertaking a number of actions to make entrepreneurs aware of what the benefits are of cooperating with science in terms of developing new solutions that are 'producible' and give a chance for successful commercialization.

In reconfiguring the offer, manager 2 is also not only directed by the current expectations of tenants, but the needs of potential companies – tenants of technology parks:

Of course, the range of services of a park includes services that suit the current expectations of service recipients, but also services that are ahead of their expectations. Departments of the park that offer support to tenants monitor current trends on the market and try to design services that will help in the development of tenants. [...] Ideas for new services also appear from people interested in opening their own business, from participants of trainings or consulting services, inquiries come from external influence (local, national, international). We want to suit their expectations. Provide them with custom-made services.

While the statements of the third manager tell us about how the park's offer is created:

Surely we can say that the profile of the park should be shaped 'from the bottom up.' This is what we did in our park. We did not define this profile when creating the park. Only when we occupied the buildings that had been built for a year, we decided what industries dominate. In expanding infrastructure, we create R&D facilities in new areas. On the basis of competence and creativity centres, we will provide new types of services, tailored to the profile of the park's enterprises.

This and the above statements are an argument for the fact that the parks' offers can be created incrementally.

These observations lead to the following conclusions that managers are not focusing solely on existing clients. Despite the facts that this would allow managers to quickly diagnose the needs and expectations of current clients depending on their current and expected organizational and technological development. Such actions of managers are appropriate. Since reconfiguration of the offer should not be done solely based on the needs of current tenants. Because the present tenants of parks do not have full knowledge, about the changes taking place on the market or technological trends appear. As a result, parks could be overly focused on the needs of existing tenants. Thus, inhibit the development of the offer in the direction appropriate for the parks. From the knowledge of activity of TP in Poland collected in this way, it can be seen that there is a permanent reconfiguration of offers, expansion of real estate and infrastructure. And the kind of changes made is proactive, rather than reactive in nature.

In reconfiguring offers, in the opinion of manager 1, the role of good practices is also significant:

I always first listen to the needs of our tenants, but often, I spontaneously implement ideas that are experimental at the beginning, and consequently they become very useful services. [...] I am not a supporter of implementing the offers of other parks, because it is often the case that what can be applied in a big city does not always work in a medium-size city. I am guided by intuition, but generally, I don't invent something that has already been invented somewhere else.

In the case of manager 2, imitation plays a large role of good practices tested in Poland and around the world:

When building the Park, we visited well and poorly functioning institutions in Poland and abroad. The park's offer is an offer that responds to the local, regional need. It is not possible to copy the model and services of a particular park, but one can imitate them and adjust to the realities of the given region. In our case, we looked for models in Finland and the USA. An example of programs taken from other parks is e.g. the soft landing program. [Entities, which will begin cooperating with the park, will be able to count on three months rent-free, and for the entire period of operation in the park, on business support.] [...] Everything actually depends on where, geographi-

cally, a given technology park is located. If it is situated in an area where for generations a given industry developed, it is logical to develop a given technology park in this area and profile. A benefit for parks may be the availability of specialists who will develop around a particular specialization and create new businesses. For tenants, it will be an opportunity for development and mutual cooperation with similar entities.

The statements of manager 3 also show that comparing offers of a specific park to the offers of other parks plays a large role in reconfiguring offers:

We look at national and international Parks. We draw conclusions from what works. As part of the benchmarking of Parks, we introduced simple services like the virtual office, correspondence service, as well as more advanced services – technology audit services, as well as technological broker service. We draw from models and try to learn from others' mistakes. We observe the best and thanks to cooperation with them, we build an offer.

Mainly, adapting TPS to changes in the environment is done by imitation, which is confirmed by the statement of manager 4:

We conduct ongoing monitoring of the demand for services among the park's tenants and other service recipients. We systematically adapt the range of services to suit the expectations of our customers. Therefore, we also remove services, which are not popular and replace them with new ones. Recently, we removed providing telephone services from our range of services. In contrast, we introduced a number of advanced services. We have created a soft-landing programme. Several research centres and competence centres. We have a Centre for Advanced Laser Technologies. We create it primarily for our tenants. For tenants operating in the metal industry and building specialized machines. But it will also be available for all entrepreneurs interested in cooperation. [...] Yes. We are open to cooperation with outside companies. We are also opening a CNC Centre [Computerized Numerical Control] – this is computer control of numerical equipment. The numerical control system, equipped with a microcomputer, which can be freely interactively programmed. CNC systems control the graphic operation of the monitor which displays programs, information about tools, correction information of tools which are extremely important when

cutting surfaces of different angles to the axis parallel to the working movement, processing parameters, they integrate the machine with other computer systems. [This usually refers to devices such as milling machines, lathes, etc.] It will be equipped with halls, numerically controlled equipment (machines), which will make it possible to create a research and development centre in the field of CNC. We are doing it for businesses operating in the production of field of manufacturing precise machine parts and devices. For manufacturing enterprises we are also opening a Rapid Prototyping Centre. The prototype created will allow entrepreneurs to see what a product looks like, if it is convenient, if the keys are fitted in the right way. Already at the design stage, one can exclude certain shortcomings.

These statements reveal the adaptation capacity of TPS in Poland. It can be seen that these capabilities are high. TP managers are able to overcome existing obstacles or limitations that result from the broadly understood conditions of the market game and the regulations and conditions determining the framework of activity of TPS. The interviews also show how complex the activities of TPS are.

A closer look at these citations leads us to the conclusion that they talk about how managers of technology parks in Poland adapt them (the parks) to new conditions, what measures they take so that new investments in the parks were accurate and used in accordance with purpose.

Another dilemma solved in the studies was how parks support enterprises implementing innovations. What do parks have to offer, when they (the enterprises) cannot cope with introducing innovations and they turn to the park for support? Because we know from literature (Kattila 2004, 305) that introducing innovations can cause significant disturbances in the enterprise. Introducing innovation requires the enterprise to develop new capabilities, often mismatched to existing practices. This is because implementation of innovation is not limited only to one functional area.

Implementation of innovations brings about changes in the organizational structure, competences of employees, methods of distribution and methods of corporate management.

As a result, the company must create new combinations of resources and capabilities that will ensure its uniqueness within the existing market and increase the chances of acquiring and maintaining competitive advantage.

Innovations are actively stimulated by the organizational conditions.

TABLE 3 Scope of Consultancy Subjects, Information and Education Offered in Technology Parks in Poland in 2013

Scope of services	(1)
Business law	86
Entrepreneurship and creating new companies	82
Developing business plan	77
Access to EU funds	73
Business management	64
Technology and patent information	59
Market research and marketing	59
Finances and taxes	59
Computer science	55
Cooperative mediation	50
Implementing new products and technologies	50
Bookkeeping and accounting	45
Foreign trade and international cooperation	41
Human resource management	36
Quality management	18

NOTES (1) Parks offering the given scope of services (%). Based on data from the database of Stowarzyszenie Organizatorów Innowacji i Przedsiębiorczości (Association of Organizers of Innovation and Entrepreneurship) in Poland.

Therefore, in cases when the company has certain shortcomings in resources, particularly in relation to property and infrastructure, then one of the ways to eliminate this barrier is to join a technology park. As a result, these enterprises can benefit from consulting. The scope of consultancy subjects is presented in table 3.

The scope of training and consultancy in the area of business law, tax law, management, finance, market analysis, marketing and others necessary at the stage of establishing and developing a company (table 3), allows adjusting the offer to the needs of a particular enterprise. For example, access to EU funds neutralizes one of the more severe barriers to the innovativeness of enterprises. This barrier is the lack of financial resources, human resources or property necessary for the effective realization of the process of generating and/or implementation of innovations. The scope of consultancy indicates that the offer is dedicated to both young companies that need help in the first years of operation, as well as mature companies. Therefore, parks have very much to offer enterprises. Technology

TABLE 4 Selected Results of Operation of Technology Parks in Poland in 2013

Type of service	(1)
Consultancy clients	103.10
Training clients	256.52
Pro-innovative services	13.10
Spin off companies	2.45
Spin out companies	0.85
Incubated projects	11.40

NOTES (1) Average for 1 park (a significant restriction of using the SOOTIP base in Poland is only access to information about the arithmetic average, and at the same time the lack of access to information on the standard deviation, which impedes making conclusions). Based on data from the database of Stowarzyszenie Organizatorów Innowacji i Przedsiębiorczości (Association of Organizers of Innovation and Entrepreneurship) in Poland.

parks can act as a platform to the production of knowledge and its transfer to the economy in the form of spin-offs or simple knowledge spillovers, enhanced by the co-location of R&D university centres and high technology enterprises on site. This leads to the recognition of usefulness of these offers by the beneficiaries.

The studies assume that the meaning of the existence of parks is based on the aptly formulated offer of services and infrastructure. Therefore, identification was conducted on the degree of using a package of services and infrastructure offered by technology parks. That is why the scope was identified of using services provided by the technology park for enterprises, which came from technology incubators after an incubation period and want to continue to work in the technology park, as well as directly entering the park without the incubation stage (see table 4).

The data presented in table 4 reveal that the parks' offers are used by companies, which are at different stages of development, i.e.: at the pre-incubation stage, the incubation stage and subsequent stages. The offer is used by enterprises providing services in the field of modern technologies and start-up. Parks providing comprehensive and professional support for new businesses fulfil incubation functions. Therefore, they are an ideal habitat for companies implementing innovations.

The revealed scope of using offers covering services and infrastructure, demonstrates the accuracy of the individual components of offers of parks in Poland. Thanks to this, the beneficiaries of these services and infrastructure can adapt to new conditions more quickly.

Identification of Innovativeness of Enterprises Operating in Technology Parks in Poland

Growing expectations of the business environment are forcing companies to implement innovations. Innovation is more than just a novel idea; it is a process that includes the development of a concept of a useable product or service in order to gain and maintain competitive advantage (Yang 2012). Innovations implemented at the right time increase the company's chances for not only achieving this advantage, but also maintaining it.

In literature, innovation is understood as the introduction of new products, services and technologies (Yang 2012). In essence, it reveals the contradictions between the discovery of existing things and creating new things. Innovation can include the introduction of a new product, a new application of an old product, new methods of production, distribution channels, processes, technologies, and new methods of competing (Alvarez and Barney 2002, 89–105).

Innovation is an ambiguous concept, closely associated with the concept of innovativeness, and often identified with it (Cho and Pucik 2005). Innovativeness is treated as a certain attribute of a company, as its ability to introduce innovation, which can be measured and evaluated. An important feature of a company's innovativeness is the continuity of innovation processes and their long-term nature. Therefore, innovation is treated as determinants of the sustainability of competitive advantage.

It is generally assumed that a company's innovativeness expresses willingness and the ability to implement new solutions, also (non)technological in nature. However, one should pay attention to another meaning of innovativeness as a measurement of the degree of innovation, especially product innovations (Garcia and Calantone 2002). This leads to answer the question: what is new and for whom? Innovations can have a varying scope of novelty. Innovativeness of products and processes can be measured by the degree in which the companies create new things. The scale of novelties fits on two extreme positions of the continuum: from products/processes that are completely new on a global scale to products/processes that are new only for a given enterprise. In other words, product innovation can bring with it a novelty for the given market and the company itself. A novelty for the company is connected with the creation of market or technological knowledge distinguishing the enterprise from the competition (Garcia and Calantone 2002). Therefore, it is worth recognizing the scale of the novelty of implementing innovations by en-



FIGURE 1 The Scale of Newly Implemented Innovations by Companies Operating in Technology Parks in Poland in 2013

terprises – TP tenants in Poland. The data presented in figure 1 show that many of the companies (TP tenants) introduce fairly standard products. However, they are characterized by high innovation of processes: production, distribution and management.

Innovations introduced by these enterprises are mostly new to the companies themselves (43%). A large part of the implemented innovations is new for the Polish market (21%) and regional market (20%). The least innovations are implemented, which are new on markets outside the European Union (6%). And these are examples of products (services) unique on a global scale, produced by these companies.

On the other hand, in the evaluation of innovativeness of enterprises (TP tenants), a division has been applied into sectors according to the methodology of the OECD (Eurostat 2009), which is based on the amount spent on research and development in relation to the value of production sold (figure 2).

The classification of the types of innovative activity according to the level of expenditure ‘R&D intensity’ developed by the OECD distinguishes the following sectors: high tech, medium-high tech, and highly technical knowledge and services (figure 2). The analysis was conducted based on the criterion of a leading type of PKD (Polish Classification of Activities) business valid as of 24 December 2007 adapted to International Standard Industrial Classification of all Economic Activities ISIC Rev. 4).

An important factor is the structure of communities in TP, i.e. the specialization of companies. After analyzing the PKD of the studied com-

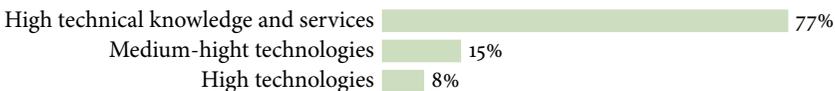


FIGURE 2 The Level of Innovativeness of Companies Operating in Technology Parks in Poland in 2013

TABLE 5 The Structure of Innovative Companies According to Polish Classification of Activities (PKD) in 2013 (%)

Sector/type of economic activity	%
<i>High technologies</i>	
Manufacture of basic pharmaceutical substances	0.99
Production of computers, electronic and optical products	6.13
Manufacture of air and spacecraft and related machinery	0.99
<i>Medium-high technologies</i>	
Production of chemicals and chemical products	3.36
Production of electric devices	3.36
Production of machines and devices, not classified elsewhere	6.32
Manufacture of motor vehicles, trailers and semi-trailers, excluding motorcycles	0.99
Production of ships and boats	0.20
Production of medical devices, instruments and products, including dentistry	0.40
<i>High technical knowledge and services</i>	
Motion picture, video and television program, sound recording and music production activities	2.57
Computer programming and computer consultancy activities and associated activities	44.07
Scientific studies and developmental works	18.38
Services in the scope of information	9.49
Telecommunications	2.77

NOTES Based on data from the database of Stowarzyszenie Organizatorów Innowacji i Przedsiębiorczości (Association of Organizers of Innovation and Entrepreneurship) in Poland.

panies, it was found that in 2013 77.27% of all innovative enterprises located in TP were from the group ‘highly technical knowledge and services.’ The least numerous were companies from the area of ‘high technology’ (8.10%). In the group of ‘medium-high technology’ companies, 14.62% constituted innovative enterprises. Therefore, it is worth conducting a more thorough identification of the structure of innovative companies – TP tenants (table 5)

A detailed analysis of the structure of innovative companies in the group ‘high technical knowledge and services’ indicates that most of them work with software and consulting in the field of information technology and related activities (44.07%), scientific studies and developmental

works (18,38%) and service activities in the field of information (9,49%) While in the group of 'medium-high technologies' the largest group constitutes enterprises manufacturing machines and devices, not elsewhere classified, and production of electrical equipment, and then those, which produce chemicals and chemical products. Among the enterprises belonging to the group 'high technologies' the largest group constitutes enterprises producing computers, electronic and optical products. And the least numerous group of companies are both companies that produce pharmaceutical substances and aircrafts, spaceships and similar machines. The multiplicity of types of enterprise activities – TP tenants, testifies to the high diversification of their innovative activity.

Conclusion

Technology parks bring together high-technology companies with the promise that collocation with other companies and opportunities for networking will make them more innovative and successful. They try to imitate the success of naturally occurring clusters by generating economies of agglomeration. Specifically, they hope to replicate conditions that would lead to collocated companies sharing resources, trading with each other, working on joint projects, and benefiting from knowledge spillovers (Koçak and Can 2013).

Technology parks in Poland are the instruments of creating a favourable environment for innovative business development. Their role as actors aimed at promoting the diffusion of innovation is revealed, among others, by:

- creating favourable conditions for business through the use of real estate and technological infrastructure on contractual principles,
- consultancy relating to business management.

The model of TP activity can distinguish primary and additional functions. Primary functions determine the activities that aim to provide businesses connected with the parks with cheaper infrastructure and administrative-training-consulting support. An important element of the parks are technology incubators that support the creation and development of companies transferring the results of scientific studies, as well as commercializing products and technologies produced at the laboratory level.

Currently, TP activity in Poland in the primary area of service is almost identical. It is becoming more diverse in the area of pro-developmental

services. The type of such support is closely linked to the phases of the development of enterprises (tenants of technology parks), so that parks could supply what they need.

Reconfiguring offers and TP real estate and infrastructure is done for both the needs and expectations of present and potential enterprises – TP tenants. Which is an expression of the proactive approach of TP managers to reconfiguring offers and park resources? Study results indicate the need for diversification of the character of these parks. On the one hand, in addition to the package of basic services, these parks should be open to introducing a package of services dictated by the changing needs and expectations of enterprises – current tenants of technology parks. On the other hand, if a technology park when expanding its offer thinks only about particular needs of current enterprises operating in TP (tenants) it could be a major brake on the development of the technology park. TP managers focusing on the needs of current enterprises (TP tenants) can have a short-term value. One can lose sight of those types of services, which should be gradually extinguished and those hidden (latent) that should be added to the TP offer. Managers are aware of these restrictions and are already constantly observing world trends in this regard. In order to be able to benefit from the opportunities, or neutralize the threats. The nature of TP activity reveals their entrepreneurial orientation. Our findings indicate that technology parks can be treated as a tool that accelerates the growth of enterprises implementing new technologies.

Parks are a regional innovation policy instrument that aim to promote interactions and technology transfer, thus stimulating innovation and growth. These infrastructures have also been described as seedbeds for innovation bearing a regional embedded focus. It is important to understand how a science park infrastructure fits in the Regional Innovation System (RIS) concept. Future studies may investigate which park-level factors not used in our study may account for the differences across parks in equipment sharing and trade-based networks.

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