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Open Models of Innovation Processes as a Future Management Challenge for Small and Medium-sized Enterprises in Poland

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Abstract

Purpose: The increasing pace of technological progress, hyper-competitiveness, volatility of markets, dominant in the contemporary society all cause significant changes in the approach to innovation and lead to the emergence of a new generation of models of innovation processes. An open innovation model is based on a systematic search for as well as research and use of various sources of opportunities for innovations that offer commercial potential. The main objective of this article is to analyse the possibilities of application of models of open innovation in management of micro, small, and medium enterprises (SMEs) in Poland. This article intends to explore the essence of open innovation by values, its inception, and conditions for its implementation in the management process specific to the SME sector.

Methodology: The study has been based on in-depth semi-structured interviews conducted among business managers/owners responsible for innovation development of SMEs in Poland (16 interviews in total).

Findings: SMEs usually do not have their own research and development (R&D) departments, but need external support and R&D solutions tailored to their needs. SMEs need innovations and skills, which requires close cooperation with different partners. In order for SMEs to benefit from innovation processes, a structured cooperation not only with scientists and researchers, but also with other market partners needs to be established and intensified. It changes both the creation of intellectual capital and the ways to manage it.

Originality: The new approach in the context of management of innovation is now one of the key challenges faced by smaller businesses. It is necessary to make changes in the approach to integration of external sources of innovation with the potential and resources at the disposal of a given company.

Keywords: open innovation, small and medium-sized enterprises, innovation management, cooperation

JEL: O31, O32, M10

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Introduction

In modern economy, characterized by volatility and a strong influence of the environment on all of its actors, companies tend to follow their own individual strategies. This applies also to innovation strategies adopted in micro, small, and medium sized enterprises (SMEs). In this sector of economy in particular, the average success rate of innovative efforts tends to be much lower than desirable mainly due to the high level of risk, complexity, and uncertainty inherent in the innovation process (Koufteros, Vonderembse, and Jayaram, 2005; Griffiths-Hemans and Grover, 2006). Innovation is considered to be one of the ways to achieve strategic objectives (e.g. technological leadership, a certain level of profit, an increase in sales), as well as the fundamental aspect of strategy (Janasz et al., 2002). An innovation strategy provides guidance on how to handle processes of innovation and how to structure the system in which they are to be implemented, which is the basis of innovation management. SMEs usually don't have their own research and development (R&D) departments, have limited financial resources, and suffer from a lack of multidisciplinary competence (Bianchi et al., 2010). In the cited reference literature we can also find examples of several limitations to innovation outcomes in SMEs, such as the lack of resources for R&D, unstructured innovation processes, and underdeveloped internal capabilities (Lichtenthaler, 2008; Madrid-Guijarro, Garcia and Van Auken, 2009). These factors may restrict their ability to innovate and achieve competitiveness. Innovation management is part of every company's strategy management and refers to the innovation processes taking place both within the company and in its surroundings. Innovation strategy makes it possible to determine the accuracy of the company's relationship with its economic environment and to take appropriate measures aimed at implementing its development strategy as required. Managing organizational relationships with customers, competitors, suppliers, public and private research institutions with the aim of acquiring additional knowledge for innovation development processes is seen as an important way for enterprises to augment their innovation capability (OECD & Eurostat, 2005). Due to this reason, SMEs in Poland face a challenge of taking advantage of benefits of opening up to innovation processes.

New conditions create a need for open innovation models, which through the exchange of intellectual capital between the company and its surroundings enable the former to go beyond the traditional perception of organization. Many SMEs rely on their ability to be innovative to achieve and sustain their competitive advantage (Parida, Westerberg and Frishammar, 2012). Among SMEs, there are more and more supporters of the concept of open innovation, which, given the limited R&D resources in the case of smaller companies, may be an effective way to increase innovation development.

Companies engaged in open innovation actively utilize and take advantage of inward and outward transfer of knowledge and technology (Chesbrough, Vanhaverbeke and West, 2006).

So far, instances of open innovation have mostly been seen analysed in large multinational corporations. A little research in this area shows that open innovation has got a chance to be implemented also in smaller organizations. Whenever studies use large research samples, they most often focus on selected problems and therefore do not reveal the full picture of the model of open innovation (Henkel, 2006; Lecocq and Demil, 2006; Laursen and Salter, 2006; Chesbrough, 2002). The notion that SMEs may benefit from external resource bases is not new, but specific knowledge about integration of open innovation processes into management processes and openness-oriented activities of SMEs in the process of innovation is still limited.

This article attempts to fill the gap in the research of implementing models of open innovation in management processes applied by SMEs. The study focuses on identifying the use of the model of open innovation at various stages of the innovation process. It also explores the issue of inbound, outbound, and coupled innovative streams taking place in organizations at various levels of innovation management of a given company.

Theoretical background

Open innovation is usually contrasted with closed innovation, considered to be the former's predecessor. Open innovation is basically about companies generating their own innovative ideas and then developing, producing, selling, distributing, and financing them on their own. Although in reality few companies implement in a fully closed innovation regime, it has become necessary with time to introduce many changes both inside and outside the area of innovation to innovative processes to let enterprises become more open. The most significant changes in a wider context of innovation include transformation of both social and economic patterns of work and an increased division of the labour market due to globalization. Changes in the approach to model innovation are pushed forward by a growing number of market institutions that deal with innovative ideas and by the emergence of more and more advanced technologies that make it possible to work collaborate remotely (Dahlander and Gann, 2010).

As part of the practice of innovation-related activities, businesses naturally focus on their internal resources, but also become involved in active cooperation with external

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partners. In this context, Chesbrough has coined the term of 'open innovation' as a contrasting approach to innovation resulting from closed innovation process, based on utilization of only a given company's own resources. In his book entitled *Open Innovation: The New Imperative for Creating and Profiting from Technology* (Chesbrough, 2003), Chesbrough propagated the concept of open innovation as "a paradigm that assumes that firms can and should use both incoming and outgoing ideas, and internal and external routes to market towards improving its own technology". The structure of open innovation is based on mechanisms of exporting and importing knowledge, ideas, and projects. According to the concept, in the world of widespread knowledge, companies should not rely on their own research, but rather acquire patents or licenses for inventions and other innovative solutions from outside. In addition to that, companies should make their own inventions that they do not use available to other entities on the basis of sale of licenses, by forming consortia, or by taking advantage of the increasingly popular spin-off scenario[2] (Dec, 2011).

In the case of a closed model of innovation, companies create, develop, and implement their own ideas taking advantage only of their internal resources as part of their technical and marketing research. In an open model of innovation, companies develop and implement both their own ideas as well as those acquired from other companies, modifying them at different stages of the applied innovation process. An open innovation strategy involves engagement of external parties in the innovation processes, with regard to both the initial phases of innovation, e.g. the conception of ideas and the last phase thereof, related to implementation of the product, e.g. testing or feedback on its usefulness. At the same time, open innovation models create opportunities to use technologies that are not interesting for a given company – because e.g. they do not fit its strategy – outside this company.

In the current discussion on innovation it has been highlighted that the degree and method of use of the open innovation model in companies varies. It depends on many external factors as the specifics of the industry and products, including the technological intensity of the sector, market volatility, product life cycle, and competitive pressure, but also on economic development, science, and technology, and on the size of the country in which the company operates. It is also important to take internal factors into consideration, such as the size of the company, the intensity, and the "aggressiveness" of innovation, the share of foreign capital in the ownership structure, domestic versus

[2] A spin-off company is a new company founded by at least one scientific or research employee, a student, or a graduate of a university, in order to commercialize innovative ideas (knowledge) or technology. A spin-off company is usually independent personally and financially from their university, but often collaborates with them on market principles.

international orientation, internal barriers to innovation, the applied business model, and its potential or strategy (Gassmann and Enkel, 2004; Keupp and Gassmann, 2009; Ebersberger, Herstad, Iversen, Kirchner and Som, 2011; Lazzarotti, Manzini and Pellegrini, 2010). It seems therefore justifiable that there is no single model of open innovation, but that we actually deal with a number of such models, each of which when implemented by an organization tailored to its needs. Reference literature offers a rich typology of open innovation, where the criteria of division involve, among others, the following:

- phase of the innovation process that has been opened,
- number of partners involved,
- intensity of utilization of external knowledge,
- type of partners involved,
- structural relationships between the participants of the innovation process,
- direction of knowledge flow between the organization and its environment,
- location of the innovation process: inside or outside the organization,
- method of selection of external stakeholders,
- intensity of cooperation and decentralization of decision-making in the process.

It seems that from the point of view of the specificity of SMEs, the criterion that best reflects the opportunity to integrate the concept of open innovation in the management of the enterprise is the phase of the innovation process that has been opened.

Innovation process and the model of open innovation

Measures undertaken in order to trigger the emergence of innovation create processes. This means measures that extend in a sequence following each other, and that are causally related to the identified changes they cause. An innovation process is thus composed of the steps that one can organize and link together combining different interactions. The course of the process makes it possible to systematize the workflow and to support the controlling of activities of both contractors and suppliers. Development of each project is divided into stages, which determines both input and output. This makes it possible to manage complex tasks and make decisions to continue or abandon the project. This tool was used by R.G. Cooper to build and implement a model of the process of innovation (see Figure 1). An innovation process begins with the pulse of innovation, which is formed in the sphere of needs. These needs, in turn, based on the accumulated knowledge resources, inspire research, and are then converted into executed project innovation, which later on becomes a product or a service. Their use generates new needs and so the cycle begins anew.

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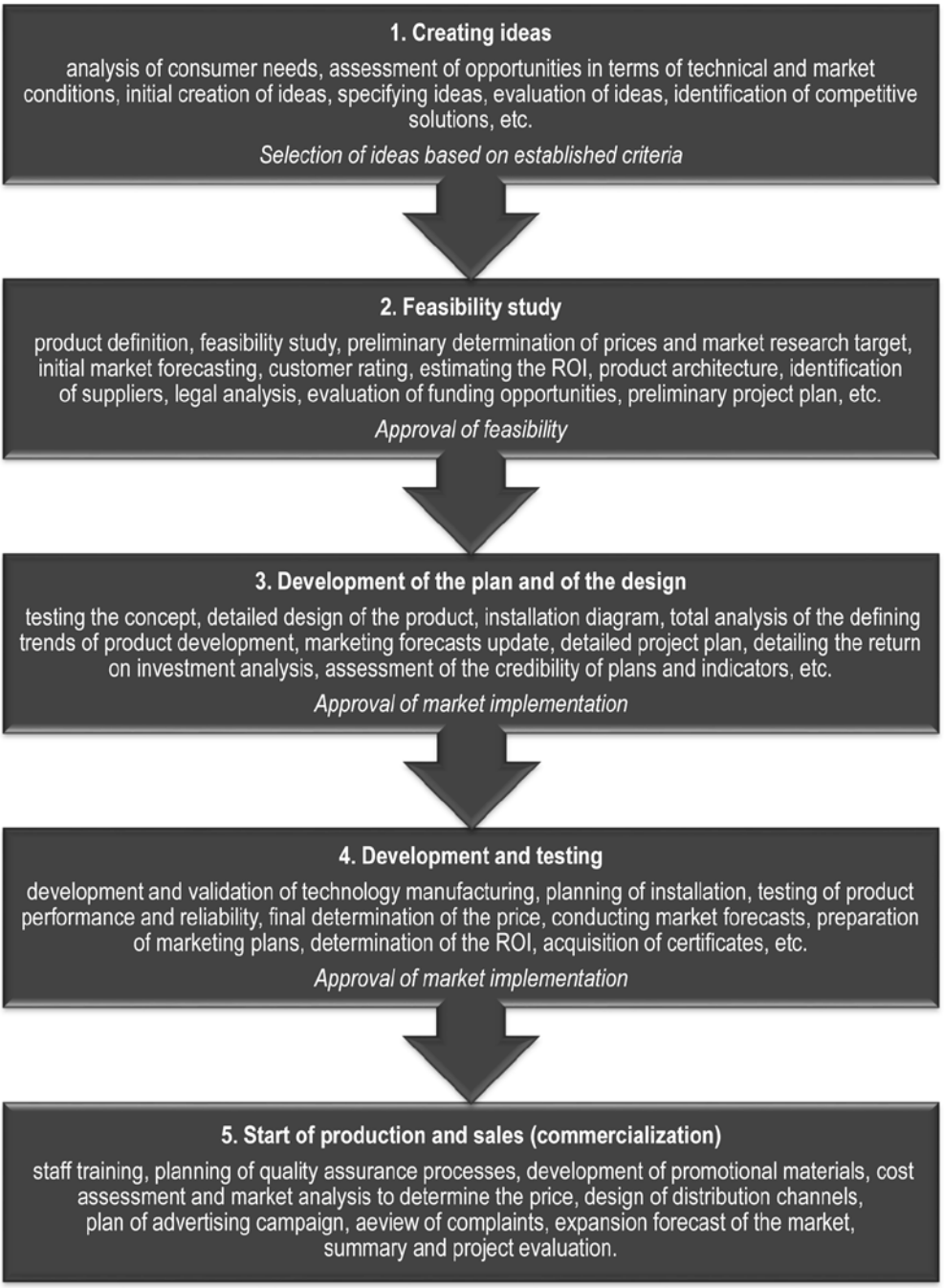
Figure 1. A diagram of the steps of an innovation process

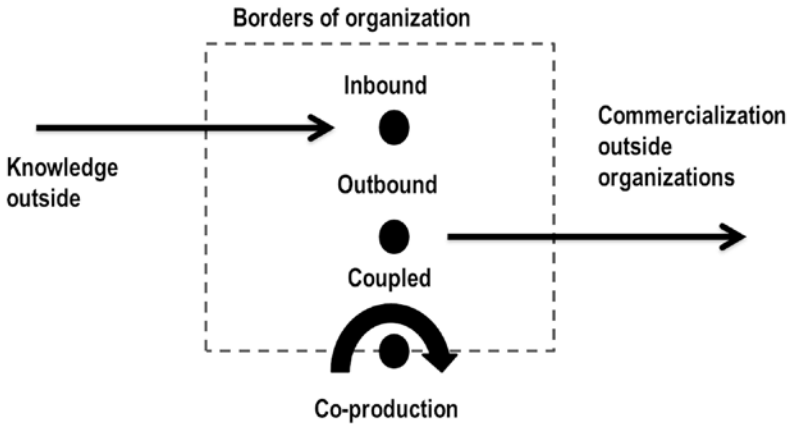


Source: own work based on Cooper (2007).

On the basis of an analysis of innovation processes, it can be stated that innovation processes occurs periodically. In the context of implementation of innovation cycles, the main part is played by R&D, which embodies the ideas of innovation, and production, which transforms projects and designs into products or services offered on the market later on.

Companies operating based on the strategy of open innovation use mechanisms involving innovation flowing into the organization and flowing out of the organization. Chesbrough and Crowther (2006) define these two types of open innovation as inbound open innovation and outbound open innovation. In the case of inbound open innovation, R&D external to the company, stemming from suppliers, customers, and other external actors, is absorbed, for instance, through technology in-licensing, acquisition, and joint development to increase the innovativeness of the company. In the case of outbound open innovation, companies not only rely on internal paths to market, but look for external organizations that are better suited to commercialize the company's given technology through, for instance, intellectual property or brand out-licensing.

Figure 2. Innovation processes in an open innovation model



Source: own work on the basis of Gassmann and Enkel (2005).

The cited reference literature defines also a third type of process, combining the aforesaid two models of open innovation (see Figure 2). With the development of the concept of open innovation, there has also appeared the idea of a coupled process (Gassman and Enkel, 2005; Dahlander and Gann, 2010), which involves creation of innovation through networking and working with entities from the company-external environment at different stages of the innovation process.

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Inbound open innovation refers to a practice of exploring and integrating external knowledge for technology development and utilization purposes. Open innovation flowing into the company is formed as a result of improvement thanks to discoveries made by others. In this process, the emphasis is on the acquisition of ideas, solutions, and technologies and implementing them in the organization's environment by creating links with other entities. The aim is to work together to gain access to the knowledge resources of partners, which makes it possible to increase the efficiency of innovation and to improve the effectiveness of the search for ways to reduce costs and protect intellectual capital. Inbound open innovation includes networking or working with other companies or universities in the scope of product development, involving customers or end users in product development activities, and licensing intellectual property in from other organizations.

Outbound open innovation is a practice of utilizing technological capabilities by taking advantage not only of internal, but also of external paths of commercialization (Chesbrough, 2003; Chesbrough and Crowther, 2006). Outbound open innovation includes spin-offs of new ventures based on prior product or technology development, and external involvement in product development and licensing technology out to other organizations (Chesbrough, Vanhaverbeke and West, 2006; Gassmann, 2006; Henkel, 2006; Lichtenthaler, 2008; 2011; Van De Vrande et al., 2009).

A coupled open innovation process combines open inbound and outbound processes. On the one hand, a company benefits from knowledge resources of its partners, which complement the company's capacity and competence. On the other hand, it is necessary for the company to provide a part of its own solutions to a collective project and share it with other entities. The level of knowledge flow and its direction depend both on the specificity of a given project and the relationship linking the partners involved. Partnerships can take on a variety of forms, ranging from bilateral alliances or joint ventures to centralized networks of companies – and individual users, where the company holds a dominant position in a fully decentralized community of open-source nature. A coupled process might involve creation of networks of partners and cooperation with external stakeholders, including both other organizations and individuals at different stages of the innovation process (Inauen and Schenker-Wicki, 2011; Chesbrough and Schwartz, 2007; Baloh, Jha and Awazu, 2008; Chariomonte, 2006; Simard and West, 2006).

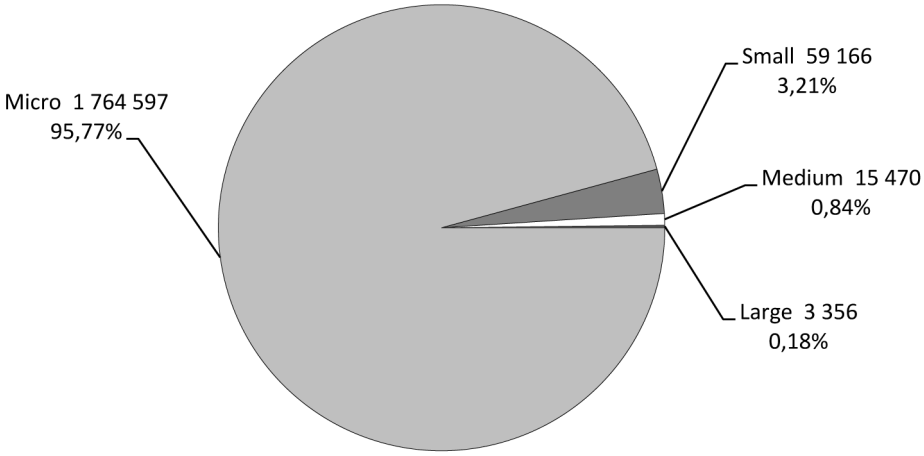
A framework of cooperation of entities involved in an innovation project involves mutual exchange of knowledge, mutual learning, and sharing of benefits produced as a result of jointly developed solutions. Working together, partners share risks, gather comple-

mentary resources, and take advantage of synergistic benefits. Cooperation within a network enables the development of products with a higher degree of novelty, and a diversity among partners has a positive effect on the results of the innovation process.

Importance of the SMEs sector in the Polish economy

The sector of micro, small, and medium-sized enterprises (SMEs) plays a major part in the development of the Polish economy. In Poland, there are 1.84 million active enterprises. Among these companies, most (99.8%) are micro, small, and medium businesses in the number of 1.76 million, 59.2 thousand, and 15.5 thousand respectively. Large companies form a group of 3.4 thousand entities (based on a report entitled *Entrepreneurship in Poland*, 2016).

Figure 3. SMEs sector in Poland



Source: own work based on *Entrepreneurship in Poland* (2016).

The SMEs sector generates 50.1% of GDP, every second zloty of its value. Among all groups of companies by size, the largest share in the GDP belongs to micro businesses – approx. 30.8%. The number of people employed in enterprises in Poland at the end of 2014 amounted to more than 9.1 million, including 6.3 million (69.2%) working in the SMEs sector. There is a clear dominance of people working in micro and small businesses. More than a half (over 4.7 million) of people employed in the enterprise sector as a whole have been working in micro and small businesses for five years now. Every fifth employee (1.6 million people) works in a medium-sized company, and every third (2.8 million people) – in a large company.

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Even these figures show that coordination in the SMEs sector is crucial for the whole economy in Poland and thus it is extremely important to monitor its development, with a particular emphasis on conditions that have an impact on the dynamics and the structure of the sector. Despite a strong economic position, Polish SMEs still occupy a rather low place in international rankings of innovation. In the European Union ranking of European Innovation Scoreboard of 2016, Poland ranked 23rd among all 28 European Union countries. Polish companies suffer from poor performance in many dimensions of innovation, including innovation activity and cooperation with other entities in this field. In this context, the possibilities of implementing the concept of open innovation in the management strategies of SMEs can be an opportunity to improve innovation indicators.

Despite the crucial importance of SMEs to the national economy, it is believed that their activities are limited primarily to local markets and products and technologies which are not of interest to multinational corporations. This means that their activities target the so-called market niches, or deal with products in the case of which the quality of being unique grants competitive advantage or a flexibility to adapt to individual customer needs. In the face of progressive changes in the environment, those managing SMEs have to face the challenge of inclusion of the concept of open innovation in the strategic management of their businesses.

Research methodology

The study is based on in-depth semi-structured interviews research conducted with managers responsible for innovation development in Polish SMEs operating in the Pomerania region. Semi-structured interviews consist of several key questions that help define the areas to be explored, but also allow the interviewer or the interviewee to elaborate in order to pursue an idea or a response in more detail (Britten, 1999). The purpose of research interviews is to explore the views, experiences, beliefs and/or motivations of individuals regarding specific matters. Qualitative methods such as interviews are believed to provide a 'deeper' understanding of social phenomena than what could be obtained through purely quantitative methods, such as questionnaires (Silverman 2000). Collis, Hussey and Hussey (2003) argue that only qualitative research conducted in a business environment provides a stronger basis for analysis and interpretation because it is grounded in the natural environment of the studied phenomenon. Interviews are, therefore, most appropriate where little is already known about the investigated phenomenon, or where detailed insights from individual participants are required. The choice of a semi-structured interview instead of a structured interview has been

made because it offers sufficient flexibility to approach various respondents differently while still covering the same areas of data collection. The interviews have been recorded to secure an accurate account of the conversations and to prevent data loss since not everything can be written down during an interview session.

A prerequisite for participation in the study for companies was to have implemented at least one in-company innovation over the past 3 years. On this basis, a sample of N = 16 companies has been created. These companies have met the criteria required to be categorized as small and medium sized enterprises. The survey was conducted during October-November 2016. The results of the study will constitute a background for preparation of a broader study on open innovation activities of SMEs in Poland as the main objective of the research is to analyse the possibilities of using the model of open innovation in strategic management of Poland-based SMEs. The conducted interviews intend to explore the essence of open innovation according to values relevant to the companies participating in the study, the source of innovation inception, and the conditions for its implementation in the management process specific for the SMEs sector.

Conclusion

All of the surveyed companies have implemented at least one innovation in the last three years. The largest number of entities (10 companies) introduced product innovations at the time covered by the study. Significantly fewer enterprises implemented process innovations (4 companies) or organizational innovations (2 companies). In the majority of cases, managers underlined that they usually waited for introducing new innovative solutions 'field-tested' by competitors in order to minimize the risk of failure. They tend to monitor the market environment carefully and analyse the behaviour of market leaders, looking for new products as part of their business profile on the international arena. Then, they picture proven models in the context of their business. *We look at leaders introducing new solutions and watch how the market reacts... We do not want to bear the risk which in our case would involve high costs, We cannot afford a failed entry with an unknown product, the risk is too high... we wait for others to do it.* Features of a passive innovation strategy appeared in the responses of representatives of the majority of service companies. These companies wait for their customers to give them a signal to implement changes. The form of contact of service companies with their customers may actually justify such responses. At the same time, the participation of 'end users' in the service process makes it possible to introduce quick changes and improvements. The surveyed companies pointed out that it often occurred to them to improve their product or to modify it in response to the needs of the product's users.

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But before proceeding with changes, such companies tend to explore and become familiar with specific needs and expectations of their customers. Only the owners of two of the surveyed companies proved to have acted based on an active innovation strategy. It is worth emphasizing that both companies based their competitive advantage on a business in niche markets.

The next step towards the adoption of open innovation depends on the step of the innovation process SMEs are open to, i.e. if they are ready to implement an inbound, an outbound, or a coupled open innovation model. The company managers were ask about the intensity of the openness of innovation in their SMEs during the innovation process from the step of creating idea to the stage of commercialization. According to the results of the conducted interviews, most SMEs lean towards technology exploration area and inbound open innovation processes. In the interviews, the interviewed managers mentioned that outbound open innovation activities were limited because of a lack of own R&D and systematic internal processes to drive such initiatives. A half of the interviewed mentioned that they had not enough managerial skills due to the lack of proficiency in the markets for technology. In the context of innovation performance, inbound open innovation processes play the main part in the case of SMEs. Access to external sources of knowledge and the ability to connect them with internal resources of intellectual capital of an organization are the key drivers of innovation and competitiveness of SMEs. When it came to external sources of knowledge, managers mentioned the following: universities and other research institutes, public institutions, corporate departments of R&D, suppliers, competitors, and individual consumers.

In response to the question about in-flowing knowledge in the process of inbound open innovation process, managers usually pointed at universities or research institutes, which were said to provide their companies with R&D support. According to the answers given, cooperation between scientific institutions conducting research in a given field and a company that is to take advantage of the outcome of this research in manufacturing or services, takes on different forms. Innovative partnerships included various areas and forms of cooperation, starting from establishment of joint research programs, through strategies for the development of new products, ending with strategies of expansion into foreign markets. The intensity of occurrence of open innovation models in innovation processes among the surveyed SMEs is illustrated in able 1 below.

Activity was also seen in the context of open innovation coupled process, which in the case of this model of partnership happened to create a network of intensive collaboration efforts between companies and research units. In the case of six companies, this interaction was integrated and involved establishment of joint teams designed to

implement a joint project covering the entire value chain consisting of creation of innovation in a comprehensive manner. Managers have emphasized that the condition for success is to ensure that all partners are able to gain real economic benefits.

Table 1. Intensity of open innovation models in innovation processes

No.	The Stages of the Innovation Process	Innovation Models		
		inbound	outbound	coupled
1.	Creating ideas	++	+	++++
2.	Feasibility Study	++++		++
3.	Development of a plan and a design	++		++
4.	Development and testing	+		++
5.	Start of production and sales (commercialization)		+	

Source: own work.

The role of managers of SMEs should be reduced to creating such conditions the implementation of innovation processes, which let companies be able to meet the goals of development as soon as possible, which given the conditions of a changing environment is one of the most important determinants of successful implementation of innovations.

According to the surveyed SMEs, the greatest weakness is the phase of generating innovative solutions that can be fit for commercial use. Only 3 of the interviewed firms declared to have own R&D departments (medium enterprises). In most cases, innovation ideas are created in the sales or in the marketing department. Among the responses of the surveyed companies, two sources of creation of new ideas have been mentioned most often. These include knowledge obtained from users of products/services and monitoring of competitors. Consistent open innovation processes in SMEs require comprehensive R&D, which will enable the transfer of projects to the sphere of implementation. As for bigger enterprises, which have their own R&D departments, there is a permanent transfer of innovation projects from the field of research into the sphere of production. Inherently innovative companies have to continuously generate innovative solutions in response to market signals.

The results obtained through intentional sampling do not show the scope of implementation of the concept of open innovation by SMEs, and present only selected aspects of application of the model of open innovation in management processes in the com-

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panies covered by the analysis. Despite the limited scope of the research, however, it is possible to formulate some recommendations for SMEs that face the challenge of pursuing innovation-oriented activities using the concept of open innovation:

- When it comes to management of innovation, SMEs should make greater use of the knowledge of the business environment and open to cooperation with other organizations in order to introduce innovation.
- Companies should make greater use of hidden knowledge and creativity of employees in order to strengthen outbound innovation model – utilization of knowledge from the outside; to this end, companies should develop their intellectual capital with particular emphasis on the components of knowledge and human resources.
- To implement a coupled model of open innovation, which refers to cooperation with other entities within the framework of innovative activities pursued as part of an undertaking, companies should take better advantage of their strengths resulting from the qualitative characteristics in building strategic partnerships, including, in particular, the use of natural flexibility, entrepreneurship, and the ability to recognize and occupy market niches
- An important factor in stimulating innovation in SMEs is being more open to cooperation with business-related environment. The condition concerns mainly exploration and exploitation of dynamic, often short-term, market opportunities associated with the financing of innovation, technology transfer, and commercialization of research results.

Based on the study, it seems clear that managers/owners of SMEs striving to increase their innovation performance should consider a more open approach to innovation. Cooperation should not be seen as a solution to all innovation problems, but as part of the portfolio where some projects are carried out by a given company alone, while other projects are pursued in cooperation with other entities. Finally, future research is still needed to improve the current understanding of the role of open innovation in the management processes applied in SMEs. Further research is also necessary to identify the characteristics of SMEs that are more likely to benefit from collaboration.

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