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Innovation ecosystem: cooperation of the agricultural market entities in the light of empirical research conducted on the basis of Group Azoty Puławy innovation consortium

Abstract. Traditionally, the innovation process has been of a closed nature because research or development projects are generated inside the company and brought to the market by a company. However, Chesbrough (2003) formulated the open innovation paradigm, assuming that companies can and should use external and internal ideas as well as external and internal market paths in search of new opportunities for their development. Openness to innovation requires cooperation with other market players, therefore some kind of partnership is necessary to co-create value with various stakeholders. The partners share their knowledge and experience as well as the benefits of jointly conducted innovative projects. Managing this type of partnership is now considered one of the key competences of the organization. However, the issue of managing the innovation ecosystem as the most mature form of open innovation has been relatively poorly researched.

We do not know much about what organizational and legal solutions are adopted by companies in partnerships for the development of innovation, what a model of cooperation could look like or how to manage such a partnership. How far should we formalize these processes? While searching for answers to these questions, the author decided to conduct empirical research in 2019 among the consortium members of Group Azoty Puławy (nitrogen fertilizers production), based on an in-depth, partially structured interview, supported by an analysis of several selected innovation ecosystems of global chemical groups (BASF, MONSANTO, SOLVAY and YARA).

Group Azoty Puławy is part of Group Azoty, the second largest producer of mineral fertilizers in Europe. In 2019, Group Azoty Puławy generated revenues of EUR 845.4 million and profit of EUR 70.7 million. The results for the first nine months of 2020 were EUR 533.7 million and EUR 37.2 million, respectively (Group Azoty Puławy interim reports 2020; 2021).

The subject of the research was a consortium established in 2011 by Group Azoty Puławy in order to implement joint innovation projects. In the period between 2011 and 2016, consortium members submitted 22 initiatives, 6 of which were completed by 2016. After five years of operation, the consortium consisted of 12 members, including 5 representatives of scientific institutions, 3 producers of agricultural products and 4 organizations representing agricultural entrepreneurs. The purpose of the research was to assess the degree of openness of project participants to cooperation during the construction phase and the management phase of the consortium.

The research of innovation consortium of the Group Azoty Puławy shows the following:

- During the construction phase, the members of the consortium were open to the accession of new partners, however selectively, i.e. according to the leader's instructions.
- The selection of partners was complementary and concerned entities serving the same market segment as leaders.
- During the management phase of the consortium, the solution that gave the leader the greatest power had the largest number of followers.
- Most of the respondents were in favour of a formalized cooperation strategy, i.e. the one based on standardizing relations between partners.

- The respondents were open to both formal (specific, contractual) and informal (relational) mechanisms in building and managing a partnership.

Keywords: Innovation Ecosystem; Innovation Consortium; Group Azoty Puławy; Business Ecosystem; Open Innovation; Ecosystem Building; Ecosystem Management

JEL Classification: O32; M21

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Інноваційна екосистема: співпраця суб'єктів аграрного ринку в світлі емпіричних досліджень, проведених на базі інноваційного консорціуму Групи «Азоти Пулави»

Анотація. Традиційно процес створення інновацій вважається закритим процесом, оскільки науково-дослідні проекти розробляються в середині окремо взятої компанії та виводяться на ринок цією ж компанією. Г. Чесбро сформулював принципи утворення парадигми відкритих інновацій, припускаючи, що компанії можуть і повинні використовувати як ідеї, запозичені ззовні, так і ті, що з'явилися всередині компанії, а також зовнішні та внутрішні шляхи, що ведуть до створення нових можливостей для розвитку компаній. Відкритість до інновацій вимагає співпраці з іншими учасниками ринку, тому для кооперації з різними заінтересованими сторонами необхідно створювати партнерства. Партнери діляться своїми знаннями та досвідом, а також користуються перевагами спільно реалізованих інноваційних проектів. Управління партнерством вважається однією із ключових компетенцій організацій. Незважаючи на це, питання управління інноваційною екосистемою як найбільш зрілою формою відкритих інновацій досліджено недостатньо. Нам небагато відомо, як компаніями приймаються організаційно-правові рішення, що стосуються розвитку інновацій, або якою є модель співпраці, або як керувати самим партнерством. У пошуках відповіді на ці питання автор статті провів емпіричне дослідження в 2019 році серед членів консорціуму інновацій Групи «Азоти Пулави» на основі поглибленого й частково структурованого інтерв'ю, підкріпленого аналізом кількох обраних інноваційних екосистем світових хімічних концернів (BASF, MONSANTO, SOLVAY та YARA). Група «Азоти Пулави» входить до складу підприємства «Група Азот» – другого за величиною виробника мінеральних добрив у Європі. У 2019 році Група «Азоти Пулави» отримала дохід у розмірі 845,4 млн. євро та прибуток у розмірі 70,7 млн. євро. Відповідно до проміжних звітів Групи «Азоти Пулави» результатом діяльності за перші дев'ять місяців 2020 року стали 533,7 млн. євро доходу та 37,2 млн. євро прибутку. Об'єктом проведеного дослідження став консорціум, створений у 2011 році Групою «Азоти Пулави» для реалізації спільних інноваційних проектів. У період між 2011 та 2016 роками члени консорціуму групи запропонували 22 ініціативи, 6 з яких були реалізовані до 2016 року. Після п'яти років діяльності консорціум складався з 12-ти членів, у тому числі 5-ти представників наукових установ, 3-х виробників сільськогосподарської продукції та 4-х організацій, представлених підприємцями, які мають відношення до сільського господарства. Метою дослідження було оцінити ступінь відкритості учасників проекту до співпраці як на етапі створення, так і на етапі управління вже створеним консорціумом. Проведене дослідження показало, що:

- На етапі створення консорціуму його члени були відкриті для вступу нових партнерів, але така готовність була вибірковою, тобто формувалася відповідно до вказівок керівника.
- Обрані партнери доповнювали один одного, а заінтересовані суб'єкти господарювання обслуговували той самий сегмент ринку.
- На етапі управління консорціумом рішення, яке наділяло керівника найбільшими повноваженнями, мало найбільше підтримки.
- Більшість респондентів висловилися за формалізовану співпрацю, тобто таку, що ґрунтується на стандартизації відносин між партнерами.
- Респонденти були відкриті як для формальних (конкретних договірних), так і неформальних механізмів побудови й управління партнерством.

Ключові слова: інноваційна екосистема; Група «Азоти Пулави»; екосистема бізнесу; відкриті інновації; побудова екосистеми; управління екосистемою.

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Иновационная экосистема: сотрудничество субъектов аграрного рынка в свете эмпирических исследований, проведенных на базе инновационного консорциума Группы «Азоты Пулавы»

Аннотация. Традиционно процесс создания инноваций считается закрытым процессом, поскольку научно-исследовательские проекты разрабатываются в среде отдельно взятой компании и выводятся на рынок этой же компанией. Г. Чесбро сформулировал принципы образования парадигмы открытых инноваций, полагая, что компании могут и должны использовать идеи, заимствованные как извне,

так и появившиеся внутри компании, а также внешние и внутренние пути, ведущие к созданию новых возможностей для развития компаний. Открытость к инновациям требует сотрудничества с другими участниками рынка, поэтому для кооперации с различными заинтересованными сторонами необходимо создавать партнерства. Партнеры делятся своими знаниями и опытом, а также пользуются преимуществами совместно реализованных инновационных проектов. Управление партнерством считается одной из ключевых компетенций организаций. Несмотря на это, вопросы управления инновационной экосистемой как наиболее зрелой формой открытых инноваций исследованы недостаточно. Нам немного известно, как компаниями принимаются организационно-правовые решения, касающиеся развития инноваций, или какой вид имеет модель сотрудничества, или как управлять самим партнерством. В поисках ответа на эти вопросы в 2019 году автором данной статьи было решено провести эмпирическое исследование среди членов инновационного консорциума Группы «Азоты Пулавы» на основе углубленного и частично структурированного интервью, подкрепленного анализом нескольких избранных инновационных экосистем мировых химических концернов (BASF, MONSANTO, SOLVAY и YARA). Консорциум Группы «Азоты Пулавы» входит в состав Группы «Азоты» – второго по величине производителя минеральных удобрений в Европе. В 2019 году Группа «Азоты Пулавы» получила доход в размере 845,4 млн. евро и прибыль в размере 70,7 млн. евро. Согласно промежуточным отчетам Группы «Азоты Пулавы» результатом деятельности концерна за первые девять месяцев 2020 года стали 533,7 млн. евро дохода и 37,2 млн. евро прибыли. Объектом проведенного исследования стал инновационный консорциум, созданный в 2011 году Группой «Азоты Пулавы» для реализации совместных инновационных проектов. В период между 2011 и 2016 годами члены консорциума предложили 22 инициативы, 6 из которых были реализованы до 2016 года. Спустя пять лет своей деятельности консорциум состоит из 12 членов, в том числе 5-ти представителей научных учреждений, 3-х производителей сельскохозяйственной продукции и 4-х организаций, представленных предпринимателями, которые имеют отношение к сельскому хозяйству. Целью исследования было оценить степень открытости участников проекта к сотрудничеству как на этапе создания, так и на этапе управления уже созданным консорциумом. Проведенное исследование показало, что:

- На этапе создания консорциума его представители были открыты для вступления в него новых партнеров, однако такая готовность была выборочной, то есть формировалась в соответствии с указаниями руководства.
- Избранные партнеры дополняли друг друга, а заинтересованные субъекты хозяйственной деятельности обслуживали тот же сегмент рынка.
- На этапе управления консорциумом решение, которое наделяло руководство наибольшими полномочиями, имело больше всего поддержки.
- Большинство респондентов высказалось в поддержку формализованной формы сотрудничества, то есть такой, которая основывается на стандартизации отношений между партнерами.
- Респонденты были открыты как для формальных (конкретных договорных), так и неформальных механизмов построения и управления партнерством.

Ключевые слова: инновационная экосистема; Группа «Азоты Пулавы»; экосистема бизнеса; открытые инновации; построение экосистемы; управление экосистемой.

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Ekosystem innowacji: współpraca podmiotów rynku rolnego w świetle badań empirycznych konsorcjum innowacji Grupy Azoty Puławy

Streszczenie. W tradycyjnym ujęciu proces innowacji jest zamknięty, ponieważ projekty badawcze czy rozwojowe generowane są wewnątrz firmy i przez firmę wprowadzane na rynek. Chesbrough sformułował paradygmat otwartych innowacji, zakładający, że firmy mogą i powinny wykorzystywać zewnętrzne i wewnętrzne pomysły, a także zewnętrzne i wewnętrzne ścieżki rynkowe w poszukiwaniu nowych możliwości swojego rozwoju. Otwartość na innowacje wymaga współpracy z innymi podmiotami na rynku, niezbędny jest zatem jakiś rodzaj partnerstwa do współtworzenia wartości z różnymi interesariuszami. Partnerzy dzielą się swoją wiedzą i doświadczeniem, jak również korzyściami ze wspólnie prowadzonych projektów innowacyjnych. Kierowanie tego rodzaju partnerstwem uważa się obecnie za jedną z kluczowych kompetencji organizacji. Jednak problematyka zarządzania ekosystemem innowacji, jako najbardziej dojrzałej formy otwartych innowacji jest stosunkowo słabo zbadana przez naukę.

Niewiele wiemy jakie rozwiązania organizacyjne i prawne przyjmują firmy w partnerstwach dla rozwoju innowacyjności, jak mógłby wyglądać model współpracy czy też jak zarządzać takim partnerstwem. Jak dalece powinniśmy formalizować te procesy? Autor poszukując odpowiedzi na te pytania postanowił przeprowadzić badania empiryczne w 2019 r. wśród konsorcjantów Grupy Azoty Puławy w oparciu o wywiad pogłębiony, częściowo ustrukturyzowany, wsparte analizą kilku wybranych ekosystemów innowacji globalnych grup chemicznych (BASF, MONSANTO, SOLVAY i YARA).

Grupa Azoty Puławy wchodzi w skład Grupy Azoty – drugiego co do wielkości w Europie producenta nawozów mineralnych. Grupa Puławy za 2019 rok osiągnęła przychód w wysokości 845,4 mln euro oraz

zysk w wysokości 70,7 mln euro. Wyniki za 9 miesięcy 2020 roku wyniosły odpowiednio 533,7 mln euro oraz 37,2 mln euro (Grupa Azoty Puławy, raporty okresowe 2020, 2021).

Przedmiotem badań było utworzone w 2011 roku przez Grupę Azoty Puławy konsorcjum w celu realizacji wspólnych projektów innowacji. Konsorcjanci w okresie 2011-2016 zgłosili 22 inicjatywy, z których 6 do 2016 roku zostało zakończonych. Po pięciu latach działalności konsorcjum liczyło 12 członków, w tym 5 przedstawicieli instytucji naukowych, 3 producentów środków dla rolnictwa oraz 4 organizacje reprezentujące przedsiębiorców rolnych. Celem badań była ocena stopnia otwartości uczestników projektu na współpracę w fazie budowy i w fazie zarządzania konsorcjum.

Z przeprowadzonych badań konsorcjum Grupy Azoty Puławy wynika, że:

- W fazie budowy, członkowie Konsorcjum byli otwarci na przystąpienie nowych partnerów, ale w sposób selektywny, tzn. według wskazań lidera.
- Dobór partnerów miał charakter komplementarny i dotyczył podmiotów obsługujących ten sam co lider segment rynku.
- W fazie zarządzania Konsorcjum więcej zwolenników miało rozwiązanie przypisujące liderowi największy wpływ.
- Większość badanych opowiedziała się za strategią współpracy sformalizowanej, tj. opartej na unormowaniu relacji między partnerami.
- Badani byli otwarci zarówno na mechanizmy formalne (tj. konkretne, umowne), jak i nieformalne (tj. relacyjne) w budowaniu i zarządzaniu partnerstwem.

Słowa kluczowe: ekosystem innowacji; Grupa Azoty Puławy; ekosystem biznesu; otwarte innowacje; budowanie i zarządzanie ekosystemem.

1. Introduction and Brief Literature Review

Initially, research on innovation was primarily interested in the business approach to research and development and the participation of science and technology in improving economic efficiency (Freeman, 1982). Recently, organizations have started to adopt a more open approach to innovation by collaborating with external stakeholders, exchanging knowledge, technology and resources across their borders. Chesbrough proposed a new paradigm of open innovation, where organizational boundaries are more permeable than closed, and innovation shifts from internal structures to external sources based on appropriate relationships with partners (Chesbrough, 2003; 2006). The works by Chesbrough attracted attention, which is proved by a steady increase in the number of published articles, books and organized conferences on this subject.

In 2019, Le, Dao, Pham and Tran conducted a bibliometric research on open innovations for the 2003-2017 period (Le, Dao, Pham, Tran, 2019). They performed their analysis on the Web of Science (WoS) database, which, according to the authors, is more rigorous in terms of the standards used than SCOPUS. These studies confirmed that the most productive country was the United States (21%), followed by the United Kingdom (16%), Germany (13%), Italy (11%) and Spain (10%). In the top fifteen countries, European countries dominated in research on open innovation (10). According to the authors, Europe's dominance as a leading region in research on open innovation can be justified by a number of the European Union activities, among which the Innovation Union initiative under the Europe 2020 strategy can be considered a milestone.

Interesting research results concern experts in the field of open innovation who published their works in the period between 2003 and 2017. The first place in this ranking was occupied by Chesbrough (University of California at Berkeley, USA) with 26 publications, the second - by Lichtenthaler (International School of Management, Germany) with 25 publications. Another author, Vanhaverbeke (Hasselt University, Belgium) published 15 articles.

Table 1 presents 10 most popular journals dealing with the issue of open innovation in the years from 2003 until 2017. Apart from publication characteristics, the study also took into account the impact factor (IF) indicators.

Research Policy, with its 45 articles, is at the top of the list, followed by Research Technology Management and the International Journal of Technology Management, both with 44 articles. None of the journals can be considered dominant in the field of open innovation. The share of publications from the top ten journals slightly exceeded 30% of all articles on this subject. The growing interest in the discussed issues is also confirmed by other researchers' works (e.g. Randhawa, Wilden, & Hohberger, 2016; or Ebrahim & Bong, 2017).

A similar analysis using bibliometric techniques was carried out in Poland by Sopińska and Dziurski regarding the term open innovation with the use of the Web of Science database (Sopińska & Dziurski, 2018). The analysis covered the years from 2003 to 2017 and on its basis, the trend regarding a number of publications has been extrapolated for 2018-2025. The results

Table 1:
Top 10 journals in open innovation research during 2003-2017

Journal	Number of Articles	Impact factor
Research Policy	45	3.688
Research Technology Management	44	0.722
International Journal of Technology Management	44	0.411
R&D Management	42	0.822
Technological Forecasting and Social Change	37	1.38
Technovation	35	2.01
Technology Analysis & Strategic Management	33	0.61
Journal of Product Innovation Management	26	3.04
Management Decision	22	0.54
Creativity and Innovation Management	21	0.75

Source: Le et al. (2019, pp. 11-12)

indicate that the number of new publications on open innovation has been growing year by year. Particularly high dynamics was observed in 2008-2010; in the following years it slightly decreased. The authors, assuming that the development trend in the number of publications on open innovation will continue in the coming years, predict that by 2025, 633 new publications will be indexed in the Web of Science database. The obtained results prove the large and growing popularity of the concept of open innovation among researchers.

Managing partnerships in the implementation of innovative companies' projects is currently considered a key competence of an organization (Blomqvist & Levy, 2006; Ritala et al., 2009; Mierzejewska, 2008). Therefore, both practitioners' and researchers' interests in searching for new ways to build and manage such ecosystems in the business and innovation dimension is growing (Adner, 2006; Dhanaraj, & Parkhe, 2006). Iansiti and Levien defined the concept of business ecosystem as one consisting of developing, interdependent and related entities: clients, agents, distribution channels, sellers of complementary products and services, suppliers and the company itself. They emphasise that ecosystems are an extension of the value chain concept, as defined by Porter, because they are a network of cooperating organizations, which are interested in creating a common offer for a specific market segment. Thus, it is a non-linear construct involving both horizontal and vertical relationships between participants focused on creating value in the network that distinguishes ecosystem from the value chain (Iansiti & Levien, 2004a).

The idea of the ecosystem originates from ecology, where organisms are interdependent in their activities, and they evolve in time in a specific natural environment (Iansiti & Levien, 2004b). This comparison reflects the modern business environment in which organizations more and more often cooperate to achieve their own and mutual goals. This is how the term *innovation ecosystem* was created and understood as a concept of cooperation around common research topics (e.g. biotechnologies or software) or organisations interested in achieving the same business or research goals, e.g. interested in providing value to customers in the same market by undertaking innovative activities (e.g. Adner & Kapoor, 2009). Usually cooperating organizations operate on the initiative and under the leadership of the central organization - the leader, implementing joint innovation projects based on an IT platform (Teece, 2007). The goal of the innovation ecosystem is not a specific product, but rather a coherent set of interrelated technologies, competences and resources that allow for co-creating a set of offers for different groups of users or clients. Therefore, the ecosystem should be viewed as a growing community that specializes in discovering, developing and implementing innovations using the resources of cooperating partners (Autio & Thomas, 2014). Basole (2009) indicates that the ability to adopt and evolve is its characteristic feature.

Ritala et al. (2013) perceive an innovation ecosystem as a business ecosystem whose goal is to create and capture value by undertaking innovative activities (both technological and business). The authors note that value creation refers to collaborative processes and actions aimed at creating value for customers and other stakeholders, while its capture or overtaking (some use the term «appropriation») refers to individual profit generated at the enterprise level, which means that companies strive to achieve their own competitive advantages and profit from it (Adegbesani & Higgins, 2010). Jackson defines the innovation ecosystem as «relationships that arise between actors or entities whose functional purpose is to enable the development of technology and innovation» (Jackson, 2011). He notes that the innovation ecosystem consists of two separate types of activity: research activity that is driven by basic research and commercial activity that is driven by the market.

The essence of the ecosystem in the business dimension boils down to building a mechanism affecting the creation and capture of value, which can be roughly divided into two phases: building and managing the ecosystem. On the other hand, in the innovative dimension, it resolves the dilemma of how deep and how wide to open up to innovative processes without harm to the intellectual property possessed; how to manage this property so that it becomes a strategic element of the company's assets, and serves to build its value. It can take place individually, at the level of company profit. However, value capture can also be done mutually, for example by establishing a new legal or organizational entity (a consortium or a special purpose vehicle) or a new business opportunity created as a result of cooperation.

Few researchers have undertaken the topic of managing innovation ecosystems. Some of them focus on mechanisms for building and managing ecosystems by dividing cooperating entities into categories, depending on knowledge mobility, ability to innovate and network stability (Dhanaraj & Parkhle, 2006). Others point to the use of the so-called «ecosystem coaching» of leaders (Doz, 1996). Others suggest specific management styles, e.g. based on the strategy of the «dominator» used by a strong leader, in which he keeps key assets essential for the functioning of the ecosystem, deciding how to share knowledge, value and development opportunities (Iansiti & Levien, 2004a). A tempting strategy, possible to use for very large, dominating corporations on their markets, however, it seems too «readable» for independent stakeholders. Of course, there are many more of these possibilities.

Generally speaking, ecosystem-building mechanisms are seen as facilitating and defining the premises for creating and capturing value, whereas ecosystem management mechanisms are perceived as those supporting the maintenance and implementation of the ability to create and capture value. Thus, there is a significant difference between the two mechanisms. The construction phase refers to the selection of partners/actors for cooperation, where the premises for creating and capturing values are just forming. Too wide opening could cause competitors to enter the project, and too deep opening could bring a threat of some innovations being taken over by cooperating partners. On the other hand, shallow involvement in such processes can only serve to increase costs without any revenue effects, as poorly advanced, underdeveloped innovations do not represent high market value (Laursen & Salter, 2006). In turn, the ecosystem management phase concerns the maintenance and coordination of the established ecosystem with selected entities. Here, value creation and its capture has its specific, real dimension.

Both the construction and management stages require establishing formal mechanisms (contracts, agreements, regulations, intellectual property rights) and informal mechanisms (open communication, trust, organizational culture, reputation) cooperation. Fjelstad calls them tangible and intangible cooperation mechanisms (Fjelstad et. al., 2012). Olander calls them mechanisms of contractual or transactional and relational management (Olander et. al., 2010). Laursen and Slater use another term, which is soft and hard openness (Laursen & Slater, 2014). Both mechanisms complement each other and are necessary in open innovation processes. In this context, tangible (contract) and intangible (relational) management mechanisms, which are useful at various stages of cooperation in the implementation of research and development projects, should be used. Measurable mechanisms mainly include structures that attract participants and facilitate their communication. They include, such tools as platforms, fora and associations, and then attempt to keep the network in such a condition as to ensure its long-term competitiveness. Intangible mechanisms are supposed to stimulate gathering and attracting partners, clearly communicate a shared vision and build trust, which is extremely useful in the implementation of common projects (Blomqvist & Levy, 2006). Trust is seen as a valuable complement to transactional relationships to reduce the unwillingness to open employees of cooperating companies (Faber, 2001).

In Poland, these types of structures are also being developed. One of such examples is a consortium established by the Group Azoty Puławy in 2011 (Pokojski, 2018a). This consortium was a kind of pilot of openness to innovation in the conditions of the Polish market. During the first five years of its operation, 12 entities joined the partnership, including representatives of the business sector, research centres and customers' representatives - agricultural entrepreneurs¹. Joining the

¹ Agricultural entrepreneurs are undoubtedly the sphere of business, but in the discussed value chain they are the final link for producers of agricultural inputs, thus they are their final customers.

consortium was a selection-based process. The most important role was played by the leader, who provided recommendations for other partners. Effective accession required the consent of all other members. It should be noted, however, that the work of the consortium depended most on the commitment of its leaders. After changes in the composition of the management board of the leader, the consortium suspended its activities. Therefore, it was not possible to create a mechanism that independently developed the proposed model (Pokojski, 2018b).

The experience gained by the consortium showed that its durability depended too much on the company's management, i.e. the leader. Mature business structures, as evidenced by the analysis of the experience of such structures as Creator Space - BASF, Monsanto Growth Ventures or CropLife, Axelera - Solvay, do not have this problem. The surveyed companies establish cooperation through agreements with several knowledge partners, such as main clients/users, universities and research institutes, and other entities interested in mutual projects. This kind of integration within innovative processes is to ensure proximity and frequent interaction between partners, as well as the development of mutual trust, which facilitates the transfer of informal (silent) knowledge within the organizational boundaries of the company.

The mechanisms of capturing value in the management phase were related to the differentiation of the share of individual entities in the value to ensure the competitiveness of the entire ecosystem (e.g. through contracts or individual, own business models of entities). Leaders of the analysed ecosystems attempt to act by adopting an open and integrative approach to the development of their ecosystems. In management, they use the dominator strategy rather than see their role as coordinators of activities.

2. Purpose

In October 2019, the author of the article decided to conduct empirical research among consortium members of the Azoty Puławy Group according to the scenario of in-depth, partly structured interview (Marek, 2005). The purpose of the research was to assess the degree of project participants' openness to cooperation during the construction phase and the management phase of the consortium. The author is aware that this study is not used to test the theory, but it can contribute to a better understanding of the studied reality (see more: Czakon, 2016).

3. Results

The establishment of the consortium by Azoty Puławy was an attempt to open the Group primarily to inbound innovations. It should be emphasized that the strategic goal of the consortium was to set the foundations of an innovation ecosystem, serving to develop the value for final customers in the agrifood market.

In the course of research, 14 interviews were conducted, including 7 with representatives of Polish research institutions, 4 with business representatives (3 with top management members and 1 with the head of the Puławy Central Committee cell in the Group Azoty Puławy (GAP) and 3 with the chairmen of agricultural entrepreneurs' organizations.

The first research problem was the evaluation of partnership in the consortium. The interviewer sought an answer to the question which partners are the most important for the successes of ongoing projects and who is supposed to decide on their selection. The respondents were asked to assess the importance of external partners on a scale of 1-5 (with 1 - negligible, 5 - very important) for the successes of ongoing projects. The results are shown in [Figure 1](#).

According to the respondents, the most valuable partners are research institutes (4.43), universities (4.29) and business partners (4.08), provided they are not competitors. Local government organizations (2.17), competitors (2.58) and online communities (2.62) are the least expected partners. It is quite surprising that respondents underestimate online communities as a source of potential innovation.

Research by Chesbrough and Brunswick has shown that the most valuable for partnerships is cooperation with clients, followed by cooperation with research centres and other entrepreneurs. Similarly, competitors were the least preferred source of knowledge acquisition or project partners (Chesbrough & Brunswicker, 2018). According to the research conducted by Sopińska and Dziurski, competitive companies and online communities were negatively perceived as participants in both creating open innovations and future cooperation (Sopińska & Dziurski, 2018).

Interesting observations concern the method of selecting partners for the consortium. Four possibilities of partner selection processes were indicated ([Figure 2](#)):

- open to any interested entity serving the agrifood market;
- open, controlled according to the instructions of the consortium leader;
- open, controlled according to the consortium instructions;
- closed to additional partners.

The respondents are open to the selection of additional partners, however in a controlled or selective way, according to the instructions given by the consortium leader (71.4%). This suggestion is not surprising, given that the leader is the initiator and sponsor of the project. None of the interviewed subjects was closed to additional partners.

Organization management is an important element of the consortium's operation. The respondents were offered five possible management methods (Figure 3). Consortium members are not determined as to how the organization is managed. The steering committee which manages

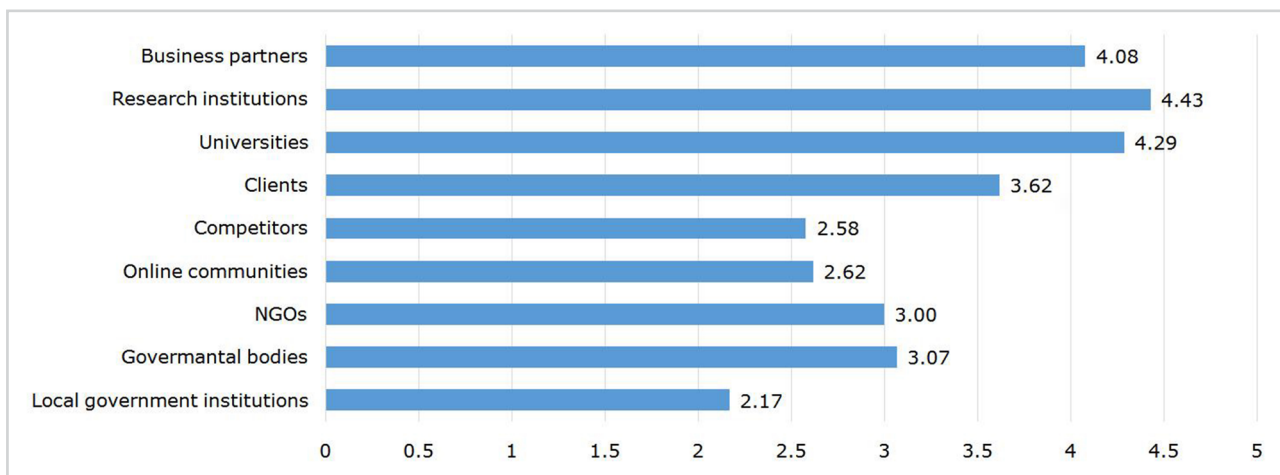


Figure 1:
The importance of external partners for the successes of ongoing projects in the consortium on a scale of 1-5

Source: Compiled by the author

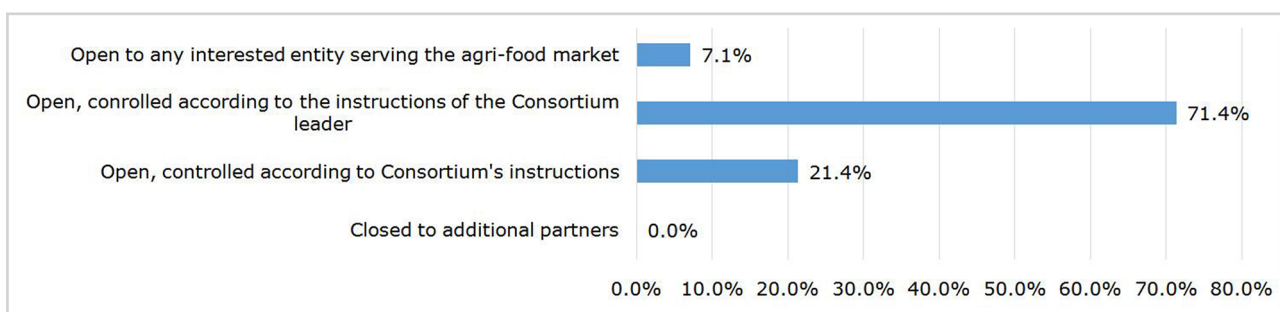


Figure 2:
Selection process of consortium partners (a single choice)

Source: Compiled by the author

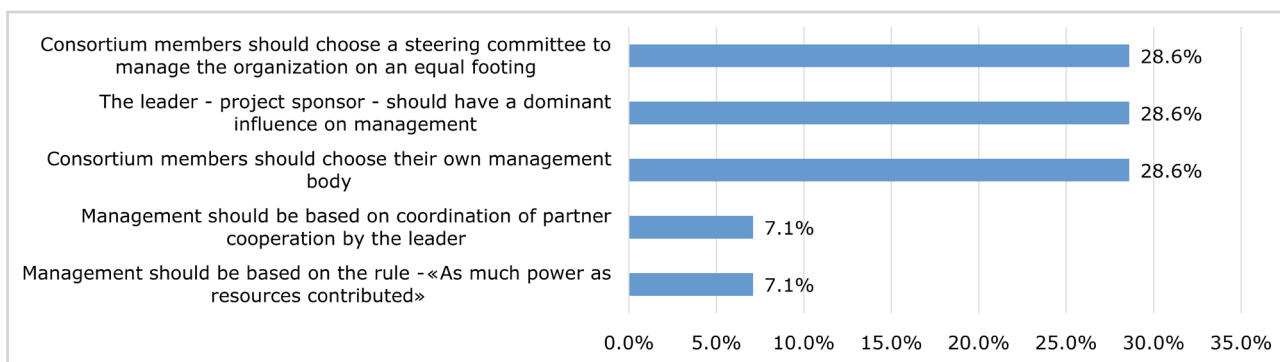


Figure 3:
Ways of consortium management (a single choice)

Source: Compiled by the author

the consortium and the leader have the same number of indications to play the dominant role as a management body. Each of these solutions is fundamentally different; from *de facto* management by the leader, in this case Group Azoty Puławy, to independent management of the consortium body established for this purpose. Experience from observing the consortium activity showed the dominant influence of the project leader and sponsor. Management based on the coordination of the partners' activities by the leader and the formula «as much power as many resources contributed» did not gain special recognition of the respondents.

Sopińska and Dziurski presented typologies of cooperation strategies which are predominant in the Polish market due to the partners' origin and form of cooperation. In the conducted research, the proposed typology of cooperation was used, asking respondents to indicate the most appropriate model for the consortium. In the research of the above-mentioned authors conducted in 2017, the conservative strategy (44% of responses) based on formalized cooperation with partners from the economic path proved to be the dominant strategy of cooperation.

In the research focusing on the GAP consortium the largest number of answers (50.0%) was obtained by the limited confidence strategy, consisting in formalized cooperation with partners from outside the business path (Figure 4). It was similarly attractive to representatives of science and business. The importance of formalizing cooperation for partners should be mentioned. The innovative strategy was attractive only to science representatives. Similarly, in the Du, Leten and Vanhaverbeke study of 2014, science representatives achieve better results in partnerships if they are managed «loosely» or less formally (Du, Leten, & Vanhaverbeke, 2014). He also points out that the respondents indicated cooperation of partners from outside the business path, in accordance with the idea of establishing a consortium. Partners were selected according to the criterion of interest in the same market segment. A strategy of formal cooperation with partners from the business path was considered to be the least attractive according to the respondents.

Another research problem concerned the attempt to resolve the dilemma of the paradox associated with the natural tension between knowledge sharing and protection of knowledge. The dilemma was to choose a model of openness in the transfer of knowledge between partners. The respondents could choose between «soft openness», involving the transfer of knowledge between partners without legal formalization of this transfer, and «hard openness» understood as cooperation based on contracts and agreements.

The survey did not indicate a more favourable model of openness, according to the respondents. Both the so-called «soft openness» and «hard openness» have the same number of supporters. A closer analysis of the results showed that the first type of openness was most frequently indicated by those representing science and clients (agricultural entrepreneurs). On the other hand, all producers were in favour of «hard openness», consisting in formalizing cooperation based on relevant contracts and agreements (Figure 5).

4. Conclusions

The research carried out by the consortium of the Group Azoty Puławy shows that the phase of building the partnership was open to various partners, but in a selective manner, i.e. according to the leader. The same solution is suggested by the respondents in possible new partnerships. The selection of partners was complementary and concerned entities serving the same market as the leader. In the management phase, however, the subjects were not determined as to its dominant

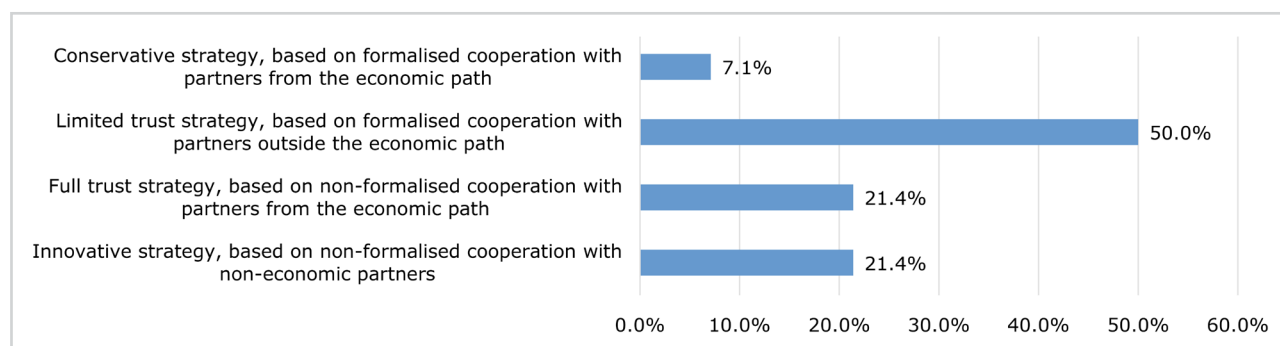


Figure 4:
Consortium cooperation strategy
Source: Compiled by the author

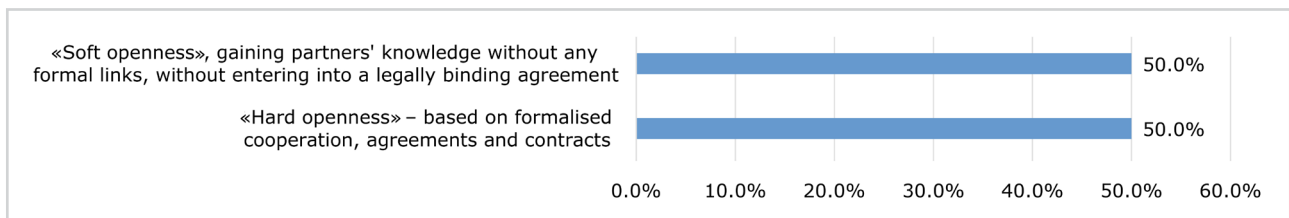


Figure 5:
Openness model in knowledge transfer between consortium members

Source: Compiled by the author

method; more followers had a solution that empowered the leader most. Most of the respondents were also in favour of a strategy of formalized cooperation, i.e. based on normalizing relationships between partners. The respondents agreed on the significant impact of the leader on capturing values in the phases of both building and managing the partnership. The respondents were open to both formal (specific, contractual) and informal (relational) mechanisms in building and managing partnerships. The leader was not open to cooperation in value creation and its capture.

Further research should explain the course of innovative processes within companies and the issue of introducing changes that lead to an increase in the «permeability of company borders» to external innovations. Research and development units alone will not implement open innovations without the support of other areas of the organizational structure.

5. Discussion

We also lack knowledge about the effectiveness of openness to innovation in the companies in Poland. We do not know, for example, how companies in Poland cope with decision-making processes in their R&D areas in order to increase their absorption capacity for external innovations. What does R&D project management look like, what is its degree of formalization? In the conditions of the Polish market, we also know very little how companies manage intellectual property in order to build the value of their organization, whether intellectual property is only the subject of protection or a strategic element of the company's assets. Similarly, we know little about what organizational and legal solutions companies adopt in partnerships for the development of innovation, what is a model of cooperation in searching for and implementing partners' innovations (in market, research and non-profit organizations) interested in the same market segment, or how to manage such a partnership. We also have a dilemma of how to commercialize innovation in partnerships outside the value chain. How far should we formalize these processes?

This intra-organizational and organizational level of business analysis is a research gap that is difficult to fill in because companies are reluctant to disclose internal processes. It is probably even more difficult to prepare solutions at the internal or organizational level for the future.

References

1. Adegbesani, J. A., & Higgins, M. J. (2010). The intra-alliance division of value created through collaboration. *Strategic Management Journal*, 32(2), 187-211. <https://doi.org/10.1002/smj.872>
2. Adner, R. (2006). Match your innovation strategy to your innovation ecosystem. *Harvard Business Review*, 84(4), 98-107. <https://hbr.org/2006/04/match-your-innovation-strategy-to-your-innovation-ecosystem>
3. Adner, R., & Kapoor, R. (2009). Value creation in innovation ecosystems: how the structure of technological interdependence affects firm performance in new technology generations. *Strategic Management Journal*, 31(3), 306-333. <https://doi.org/10.1002/smj.821>
4. Autio, E., & Thomas, L. (2014). Innovation ecosystems: Implications for innovation management. In M. Dodgson, D. M. Gann, & N. Phillips (Eds.), *Innovation management* (pp. 204-288). Oxford University Press.
5. Basole, R. C. (2009). Visualization of interfirm relations in a converging mobile ecosystem, *Journal of Information Technology*, 24, 144-159. <https://doi.org/10.1057/jit.2008.34>
6. Blomqvist, K., & Levy, J. (2006). Collaboration capability - a focal concept in knowledge creation and collaborative innovation in networks. *International Journal of Management Concept and Philosophy*, 2(1), 31-48. <https://doi.org/10.1504/IJMCP.2006.009645>
7. Chesbrough, H. (2003). The area of open innovation. *MIT Sloan Management Review*, 44(3), 35-41. https://www.researchgate.net/publication/279868179_The_Era_of_Open_Innovation
8. Chesbrough, H. (2006). *Open Business Models: How to thrive in the New Innovation Landscape*. Boston: Harvard Business School Press.
9. Chesbrough, H., & Brunswicker, S. (2018). The adoption of open innovation in large firms. *Technology Management*, 61(1), 35-45. <https://doi.org/10.1080/08956308.2018.1399022>

10. Czakon, W. (2016). *The basics of the research methodology in social sciences*. Warsaw: Wydawnictwo Nieoczywiste (in Pol.).
11. Dhanaraj, C., & Parkhe, A. (2006). Orchestrating innovation networks. *Academy of Management Review*, 31(3), 659-669. <https://doi.org/10.5465/amr.2006.21318923>
12. Doz, Y. L. (1996). The evolution of cooperation in strategic alliances: initial conditions of learning processes? *Strategic Management Journal*, 17(S1), 55-83. <https://doi.org/10.1002/smj.4250171006>
13. Du, J., Leten, B., & Vanhaverbeke, W. (2014). Managing open innovation projects with science-based and market-based partners. *Research Policy*, 43(5), 828-840. <https://doi.org/10.1016/j.respol.2013.12.008>
14. Ebrahim, N. A., & Bong, Y. B. (2017). Open innovation: A bibliometric study. *International Journal of Innovation*, 5(3). <https://doi.org/10.5585/iji.v5i3.184>
15. Faber, E. C. (2001). *Managing collaborative new product development*. Enschede: Twente University Press.
16. Fjelstad, Ø., Snow, C., Miles, R., & Lettl, C. (2012). The architecture of collaboration. *Strategic Management Journal*, 33(6), 734-750. <https://doi.org/10.1002/smj.1968>
17. Freeman, Ch. (1982). *The economics of industrial innovation*. London: F. Printer.
18. Iansiti, M., & Levien, R. (2004). Strategy as ecology. *Harvard Business Review*, 82(3), 68-78. <https://hbr.org/2004/03/strategy-as-ecology>
19. Iansiti, M., & Levien, R. (2004a). *The keystone advantage: what the new dynamics of business ecosystems mean for strategy, innovation and sustainability*. Harvard Business School Press.
20. Jackson, D. J. (2011). What is an innovation ecosystem? *National Science Foundation*, 2(1), 1-11. https://erc-assoc.org/sites/default/files/topics/policy_studies/DJackson_Innovation%20Ecosystem_03-15-11.pdf
21. Laursen, K., & Salter, A. (2006). Open innovation: The Role of Openness in Explaining Innovation Performance Among U. K. Manufacturing Firms. *Strategic Management Journal*, 27(2), 131-150. <https://doi.org/10.1002/smj.507>
22. Le, H. T., Dao, Q. T., Pham, V. C., & Tran, D. T. (2019). Global trend of open innovation research: A bibliometric analysis. *Cogent Business & Management*, 6(1). <https://doi.org/10.1080/23311975.2019.1633808>
23. Marek, J. (2005). In-depth personal interviews. In K. Mazurek-Łopacińska (Ed.), *Marketing Research. Theory and Practice* (pp. 149-153). Warsaw: Wydawnictwo Naukowe PWN (in Pol.).
24. Mierzejewska, B. (2008). Open Innovation - a new approach to the processes of innovation. *E-mentor*, 24(2). <http://www.e-mentor.edu.pl/artykul/index/numer/24/id/539> (in Pol.)
25. Olander, H., Hurmelinna-Laukkanen, P., Blomqvist, K., & Ritala, P. (2010). The dynamics of relational and contractual governance mechanisms in knowledge sharing of collaborative R&D projects. *Knowledge and Process Management*, 17(4), 188-204. <https://doi.org/10.1002/kpm.356>
26. Pokojski, Z. (2018). A model of cooperation platform for entities involved in the agricultural market open to innovations in Poland. *Economic and Environmental Studies*, 18(2), 809-823. <https://doi.org/10.25167/ees.2018.46.21>
27. Pokojski, Z. (2018). In searching for business model open for innovations on agricultural market - conceptual approach. *Economic Sciences for Agribusiness and Rural Economy*, 1, 237-242. <https://doi.org/10.22630/ESARE.2018.1.33>
28. Randhawa, K., Wilden, R., & Hohberger, J., (2016). A bibliometric review of open innovation: Setting a research agenda. *Journal of Product Innovation Management*, 33(6), 750-772. <https://doi.org/10.1111/jpim.12312>
29. Ritala, P., Agouridas, V., Assimakopoulos, D., & Gies, O. (2013). Value creation and capture mechanisms in innovation ecosystems: a comparative case study. *International Journal of Technology Management*, 63(3-4), 244-267. <https://doi.org/10.1504/IJTM.2013.056900>
30. Ritala, P., Armila, L., & Blomqvist, K. (2009). Innovation orchestration capability - defining the organizational and individual level determinants. *International Journal of Innovation Management*, 13(04), 569-591. <https://doi.org/10.1142/S136391960900242X>
31. Sopińska, A., & Dziurski, P. (2018). *Open innovation. The prospect of cooperation and knowledge management*. Warsaw: Oficyna Wydawnicza SGH. https://wydawnictwo.sgh.waw.pl/produkty/profilProduktu/id/1035/OTWARTE_INNOWACJE_Agnieszka_Sopinska_Patryk_Dziurski (in Pol.)
32. Teece, D. J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28(13), 1319-1350. <https://doi.org/10.1002/smj.640>
33. The Group Azoty Pulawy. (2021). *Interim reports 2020; 2021*. <https://pulawy.grupaazoty.com/relacje-inwestorskie/raporty-okresowe> (in Pol.)

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