DOI:10.17951/h.2024.58.1.111-123

ANNALES
UNIVERSITATIS MARIAE CURIE-SKŁODOWSKA
LUBLIN – POLONIA
VOL. LVIII, 1 SECTIO H 2024

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Ecological Innovations as a Chance for the Development of Innovativeness of Enterprises in Poland

Keywords: ecological innovations; inter-organizational cooperation; multidimensional helix model

JEL: 0310; 0440; Q550

How to quote this paper: Golińska-Pieszyńska, M., & Kazubski, B.M. (2024). Ecological Innovations as a Chance for the Development of Innovativeness of Enterprises in Poland. *Annales Universitatis Mariae Curie-Skłodowska, Sectio H – Oeconomia*, *58*(1), 111–123.

Abstract

Theoretical background: Creating eco-innovations requires non-standard, pro-ecological activities and creating relationships with the environment. The article deals with the issue of creating and developing ecological innovations in the aspect of the helix model, analyzing inter-organizational cooperation.
Purpose of the article: The purpose of this article is to present inter-organizational cooperation for the creation and development of ecological innovations in the perspective of increasing the innovativeness of enterprises.
Research methods: Initial survey entitled "Partnership of Science and Business", conducted in 2017 among Łódź enterprises cooperating with the technical university. Another survey was conducted in 2019, using

the CATI technique, by DSC Research Group, among all Łódź enterprises, in Łódź science institutions and public benefit organizations.
Main findings: The conclusion indicates that the ecological perspective increases the awareness of mutual inter-organizational relations in the formula of a multidimensional helix model, which may contribute to the increase in innovativeness of Polish enterprises. The obtained research results will be used to continue research on improving inter-organizational cooperation in creating ecological innovations in the perspective of increasing the innovativeness of enterprises and they are the current application shot for business.

Introduction

In the past years, there was a social belief that environmental protection policy and related problems were not consistent with socio-economic development. It was the Brundtland Commission Report (1987) where the concept of sustainable development was introduced as a process that is intended to integrate the concepts of socio-economic development and environmental protection, which is part of ecological innovations. In view of the increasing pollution of the environment and the depletion of natural resources, eco-innovations are increasingly in the interest of decision-makers, entrepreneurs and researchers (Burzyńska & Hajdys, 2021, pp. 63–86). Poland's environmental policy is implemented on the basis of "The 2030 National Environmental Policy" (Ministerstwo Środowiska, 2019). This document is the ground for investing European funds from the financial perspective for 2021–2027. Therefore, many Polish entrepreneurs combine innovation and environmental protection in their businesses. Startups, by using modern environmentally-friendly technology, contribute to solving important socio-economic challenges as part of their core business (Kozmiński Business Hub, 2020). The positive effects of using eco-innovations include, among others, reducing environmental pollution, limiting the effects of economic activity on the natural environment, improving human health and safety. The first part of the article presents the concept and essence of eco-innovation, and then indicates inter-organizational cooperation as a way of creating pro-ecological products and processes that significantly reduce the negative impact on the environment. In addition, attention was drawn to the need for enterprises to bear responsibility for the social environment in terms of the development of ecological innovations.

The purpose of the article is to present how inter-organizational cooperation can be used to create ecological innovations in the perspective of increasing the innovativeness of enterprises. The pursuit of this purpose makes it possible to put forward a thesis that eco-innovations cannot exist without the approval of society and social relations, which is justified by the multidimensional helix model and independent research.

The studies described in this publication are addressed to the issue of creating eco-innovation in the formula of a multidimensional helix. They are part of the research conducted in two stages. In 2017, entrepreneurs from Łódź selected by

purposive sampling method, who cooperate with Łódź University of Technology were surveyed using questionnaires. As part of the conducted research, interviews with representatives of science were also conducted (Golińska-Pieszyńska, 2017, pp. 261–270). Then, in the years 2019–2020, as part of the project "Cooperation Between Science and Business in the Aspect of the Four-Dimensional Helix and Economic Practice" using the CATI method, a survey was conducted among all Łódź enterprises, universities and public benefit organizations (*Współpraca nauki i...*, 2020). The studies assumed that local authorities and office employees create pro-ecological initiatives and strengthen inter-organizational cooperation. The obtained research results allow for the presentation of activities and relationships implemented as part of a multidimensional helix, which contributes to more effective creation of eco-innovation and increasing the innovativeness of enterprises.

Literature review

In the literature, many terms for eco-innovation can be found because, like the concept of innovation, eco-innovation is a complex phenomenon that brings benefits to the environment. Thus, James defines it as new products and processes that provide value for the customer and business, while reducing environmental impact (James, 2021, pp. 77–97). Other researchers, Kemp and Pearson (2007, pp. 4–10), as well as Oltra and Saint Jean (2009, pp. 567–583), perceive ecological innovations as a new form of innovations, reducing the negative impact of economic processes on the natural environment which is a rather narrow approach to the essence of ecological innovations. Particularly noteworthy is the approach of the European Commission, which first treated ecological innovations in the category of environmental technologies, the use of which is less harmful to the environment than in the case of alternative solutions (European Commission, 2004, pp. 6–7). In the following years, the European Commission extended its approach to this notion, treating eco-innovations as all forms of innovations aimed at significant and visible progress towards the implementation of sustainable development, by reducing the negative impact on the environment or achieving greater efficiency and responsible use of natural resources (European Commission, 2007). The definition of "eco-innovation" is developed in the OECD study; in the presented approach, eco-innovation means the creation or implementation of new or significantly improved products, processes, marketing methods, organizational structures and institutional solutions that lead to an improvement in the condition of the natural environment compared to appropriate alternative solutions (OECD, 2010, p. 15). A convergent interpretation of eco-innovation was proposed in the study of the Central Statistical Office (Rozkuta, 2010, p. 48), which means that creating eco-innovations requires non-standard, pro-ecological methods of operation, while manufacturing of products using environmentally friendly methods is still an element of competitive edge.

An important aspect of eco-innovations is the assumption that they cannot exist without social approval, which increases the effectiveness of their implementation. This means the development of ecological innovations, which is based on changes caused by the introduction of new solutions created in cooperation involving the state, citizens and entrepreneurs. Therefore, it can be said that the broad approach to eco-innovation is applicable to pro-innovative solutions in the activities of enterprises as well as governmental, institutional and social solutions, which contribute to sustainable development, to increasing innovativeness and improvement of the quality of life of the society. It is a holistic view of the development of eco-innovation, which is not only related to environmental policy, but also to social reasons and the development of new technologies. Many entrepreneurs focus on innovative, pro-ecological technological solutions, but often, due to insufficient financial resources, government and institutional activities seem to be necessary, which are in line with the research undertaken by the authors. In order to effectively build a multidimensional helix, it is required to create inter-organizational cooperation.

In further discussions on the subject of this article, it is worth noting that research on ecological innovations was initiated in the 1990s by Fusseler and James (1996) in the face of the growing awareness of environmental threats at that time. Other researchers, i.e. Kemp and Pearson (2007), conducting further research on the development of eco-innovations, came to the conclusion that as a result of their application, the negative impact on the natural environment is reduced in relation to the effects of other solutions.

In pragmatic terms, this means that eco-innovations contributed to the development of clean technologies and the economy becomes greener. The issues of eco-innovation in Poland are dealt with by several institutions, except for the Central Statistical Office, such as the Institute for Structural Research Scientific Foundation (Szpor & Śniegocki, 2012), the Polish Agency for Enterprise Development (Woźniak et al., 2010) and researchers from various research centres and regions of Poland (Zuzek, 2015; Gałązka, 2017; Burzyńska & Hajdys, 2021). The implementation of pro-ecological solutions is becoming a challenge and a necessity for many entrepreneurs. Their expectations in the field of eco-innovation are met by the "Ecolabnet" network, which ensures cooperation with many enterprises, business institutions, as well as scientific and research units in the countries of the Baltic Sea Region (Bień et al., 2020, pp. 12–18). Therefore, it can be said that an important factor conducive to the development of eco-innovations is inter-organizational cooperation in a variety of forms. These are activities, interactions and relationships implemented within the four-dimensional helix, i.e. business, science, administration, social connections, which will be discussed further in this article. The results presented in this article are addressed to the issue of creating eco-innovations in the formula of a multidimensional helix.

The (Triple and Quadruple) Helix Models in building inter-organizational cooperation for the development of eco-innovations

Cooperation between science, business and the public sector is becoming increasingly important. This process is particularly demonstrated by various innovative projects that significantly change the conditions for creating and developing eco-innovations. As part of the relationship between the world of science, economy and the public sphere, innovative projects are created and implemented that significantly affect the pro-ecological development in the regions of Poland. The dimension of these relations is reflected in the Triple Helix Model, which, when extended with the "social" factor, has a positive effect on establishing relations among companies, scientists and administration, as it strengthens them, stimulating, above all, trust among them (the Quadruple Helix Model). It should be clearly emphasized that the optimal cooperation between the participants in the undertaken innovative projects can be ensured by the Triple Helix Model. According to Leydesdorff and Etzkowitz (2001, pp. 338–344), the Triple Helix Model is a model that includes mutually complex relationships that occur in the process of creating knowledge between three kinds of entities: scientific centres (universities, research and scientific centres, supporting institutions), industry (enterprises) and the government (including local government institutions). Thus, it can be said that Leydesdorff and Etzkowitz proposed the Triple Helix Model, based on the relationship among science, business and administration, which is associated with the concept of a knowledge-based economy. The common goal for the development of a knowledge-based economy should be activities in an innovative environment, consisting of university "spin-off" companies, strategic alliances of companies with various levels of technological advancement and "public" laboratories (national and regional research centres). The Triple Helix Model is based on a non-linear model that replaces linear models (Golińska-Pieszyńska, 2011, pp. 62–63). It makes it possible to analyse non-linear interactions and mutual penetration of institutions from three spheres, consisting in playing roles originally assigned to a different sector. In this model approach, universities become entrepreneurial, a research centre can function as a business, helping to form new companies that are established in business incubators, and companies develop academic functions by sharing knowledge and participating in innovative projects. The public sector supports new enterprises through various financial programmes and changes in applicable laws and regulations. With regard to eco-innovations, the concept of the Quadruple Helix Model is justified by the fourth dimension, which is the social sector (Tomaszuk & Wasiluk, 2021).

The Quadruple Helix Model enables the analysis of the interaction of four dimensions in terms of the increase in the innovativeness of enterprises, generated by ecological innovations. Ecological innovations are the result of co-creation of cooperation between the four dimensions of the helix, i.e. business, science, public administration, social sector and social relations, connected through networks, part-

nerships and relationships. With regard to the natural environment as an important element of creating ecological innovations, an interesting proposal is the concept of the Quintuple Helix Model, which fully ensures sustainable development. This model includes the following elements: universities, education system, industry, companies, state and government, political and economic system, media and society, natural environment (Carayannis et al., 2012). In the case of designing and managing large eco-innovative projects, the concepts of helix models can be used, as exemplified by the DIONYSOS (www1) and PROWATER (www2) projects.

Research methods

The research presents in article was conducted in two stages and the survey was used in two-stage research process. In 2017, entrepreneurs from Łódź selected by purposive sampling method, who cooperate with Łódź University of Technology were surveyed using questionnaires. As part of the conducted research, interviews with representatives of science were also conducted (Golińska-Pieszyńska, 2017, pp. 261–270). Then, in the years 2019-2020, as part of the project "Cooperation Between Science and Business in the Aspect of the Four-Dimensional Helix and Economic Practice" using the CATI method, a survey was conducted among all Łódź enterprises, universities and public benefit organizations (*Współpraca nauki i…*, 2020).

Results

This part of article presents creating ecological innovations through inter-organizational cooperation in the light of research conducted in Łódź region. Modern organizations wishing to ensure sustainable development enter into direct and indirect relationships with other organizations. Any cooperation is created by links and relationships that can arise on various levels, have a different degree of durability, content and intensity, and can have various forms (Adamik, 2012, pp. 42–150, 163). Organizational cooperation between science and business can be defined as an activity with a variable or permanent scope and duration – it can be a short-term or medium-term activity between its participants, which can have various forms (Golińska-Pieszyńska, 2017, p. 262), for example, joint work on a project task, assistance in creating an innovation concept. In the case of a multi-entity activity, there is interaction or liaison, which may be in the form of cooperation. Cooperation in its essence is based on joint achievement of mutually non-contradictory goals. It is a joint action, interaction or liaison in achieving benefits for both parties greater than in the case of each entity acting separately. When choosing partners for cooperation, one should look at the organization not only in terms of the resources desired in the operation, but also take

into account the importance of the needs and motivations to engage in cooperation that shape its areas for the future. At the junction of science and business, it is a multifaceted cooperation, not always partnership, which is often carried out through less formal relations, also enabling the creation of innovations. The study of research entitled "Partnership of Science and Business" conducted in 2017 among Łódź enterprises cooperating with Łódź University of Technology indicated joint activities and initiatives (Golińska-Pieszyńska, 2017, pp. 261–268). In the survey using purposive sampling, the respondents were managers of small and medium-sized enterprises from the chemical and biotechnology industries in the Łódź region and people responsible for technology transfer in institutes/departments with a profile in chemistry and biotechnology of the Łódź University of Technology. The results of this study show that process innovations were often developed by the company implementing them itself or the technology was purchased in the form of a licence, while product innovations were developed independently and in cooperation with other entities and institutions, including foreign ones. Ecological innovations were defined by the respondents as innovations related to environmental protection (36% of responses). Respondents representing the industry did not show particular interest in the results of academic research and new technologies, probably because the implementation of research and development works was ensured by a good level of technical equipment and unique apparatus (63% of responses). In turn, the respondents of the surveyed university indicated that in addition to technological innovations, innovations related to ecology and environmental protection were created, and their recipients were usually small technological companies. It should be added that only 33% of respondents from industry indicated joint research projects with a university, which suggests that the transfer of knowledge and technology as one of the forms of cooperation between business and science, also in the field of ecological innovations, was implemented quite rarely. Therefore, the real cooperation of the surveyed enterprises with the university usually included sporadic contacts regarding the implementation of a specific research topic/project. The empirical material collected and processed at this stage of research (2017) was the base material for the conceptualization of further authorial research on inter-organizational cooperation, which was carried out in 2019in Łódź region (*Współpraca nauki i…*, 2020). This survey was carried out using the CATI technique (computer-assisted telephone interview) with the participation of 360 respondents, but in an in-depth, structured interview with 16 respondents, the TIDI (telephone individual in-depth interviews) technique was used. The essence of the second stage of the research included an attempt to diagnose inter-organizational relations between business and science in the aspect of the four-dimensional helix. The fourth dimension of the helix is determined by social factors and connections, which is often referred to by the respondents as "social inspiration" (33% of responses). Respondents in their statements emphasize that cooperation within the four-dimensional helix is possible after developing an appropriate cooperation formula, based on mutual trust, exchange of experience and proactive participation in

innovative projects. Most entrepreneurs believe that the improvement of mutual inter-organizational cooperation within the four-dimensional helix (which in the future will contribute to the growth of their innovativeness) can be influenced in particular by the creation of ecological innovations inspired by social needs (64.6% of responses), appreciation of social innovations by managers (58.3% of responses), and creating law for new organizational structures, such as contract research organizations (53.4% of responses). Respondents in their statements are aware of the need to use public institutions, such as public benefit organizations (associations and organizations working for environmental protection) for further inspiration to create ecological innovations (43.5% of responses). For entrepreneurs, however, ecological innovations are often new solutions that have been introduced into business practice alongside technological innovations. According to some individual respondents, "depending on the situation, inspiration for environmentally-friendly technological innovation may come both from external research teams and from customers, distributors, suppliers or even employees of the company, who are not involved in the development of technology, but maintain numerous contacts with the environment and have opportunity to observe pro-environmental trends that are important for the company". The respondents are of the opinion that the ecological innovations created in the enterprise account for ¼ of the introduced innovations (the remaining part consists of traditional technological innovations, i.e. product and process solutions). If the surveyed enterprises developed new "eco-products" or methods of their production, it was mostly done by the enterprise itself as part of research and development works. Only 16.9% of entrepreneurs cooperated in this area with domestic or foreign scientific institutions, foreign corporations or domestic enterprises. Many entrepreneurs (87% of responses) believe that before making a decision on the conceptualization of research on innovation, they take into account the ecological aspect, which results from the desire to use environmentally friendly manufacturing technology. They claim that they are "looking for new solutions, with an emphasis on environmental protection and creating customer-friendly products". The statements of the respondents show that it is important that "their products and technology are environmentally friendly, reduce carbon dioxide emissions into the atmosphere". It should be emphasized that the phenomenon of technology fusion is of particular importance when creating eco-innovations – synergy between previously separate technological areas, which force companies to acquire new competences and employ specialists in fields (e.g. ecology, environmental protection) previously unrelated to their activities. More than half of the respondents (52.1% of responses) admit that they see the possibility of long-term cooperation with another entity (usually an enterprise), which shows how important it is to indicate strengths in building relationships with other enterprises, as well as with institutions from the science sector and public institutions. As a result, this approach may increase the number of innovative "eco-products", new patents and "clean technologies", which lead to innovativeness of enterprises. It is worth adding that, in the opinion of the respondents, who are representatives of Łódź universities, the

improvement of inter-organizational cooperation under the concept of the four-dimensional helix is influenced by the "potential in supporting information exchange" between organizations (intellectual resources) – 46% of responses, favourable financial and legal conditions, conducive to the implementation of joint projects as ecological innovations (46% of responses) and developing of good practices in mutual relations with entrepreneurs (82% of responses). To summarise the above discussion based on the results of the conducted research, it can be stated that there will be an integration of enterprises, public administration and academic units, which, depending on the existing social problem expressed in support programmes for a friendly, natural environment, will comprehensively develop a research topic/project in the field of ecological innovations, and then, through technology transfer centres, they will pilot its implementation, which in the future will result in an increase in the innovativeness of enterprises and tightening mutual cooperation among science, business and administration, and the developed relations among them will strengthen cooperation and joint activities and project undertakings.

Discussion

In the formula of the four-dimensional helix, the social element is very important, so this part of article discussed the topic: "The development of eco-innovations and the policy of corporate social responsibility". According to scientists, experts and politicians, corporate social responsibility (CSR) is one of the most important priorities faced by the business world. This is mainly related to the need to take care of limited natural resources and to ensure a fair and sustainable economic policy. The importance and importance of CSR in the contemporary social space is evidenced by numerous scientific studies published every year in the most important journals. Referring to the need for business to bear responsibility for the social environment, the editors of the FORBES (www.forbes.com) magazine formulated the ten most important priorities that business organizations faced in 2021. These were: searching for the truth, diversity, equity and inclusion, achieving carbon neutrality, standing with employees, pursuing purpose over passion, searching for breakthrough innovations, supporting the fight against the COVID-19 pandemic, supporting volunteering activities, philanthropic support for small businesses (to ensure their sustainability) or promoting the UN Sustainable Development Goals. One of the most important undertakings with the framework of UN activities is the Global Company project (www.globalcompact.org.pl), which was established on the initiative of the UN Secretary General, Kofi Annan. This project is a call for business people to follow 10 basic principles in the field of human rights, labour rights, environmental protection and anti-corruption in their activities. There are different approaches to defining the CRS in the literature and many strategic documents. According to the World Business Council for Sustainable Development

(GAEA, 2023), definition of "corporate social responsibility" is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large. The term "CSR" is most often used to describe a set of ideas or concepts according to which business activities serve more than just generating income for shareholders. CSR is a certain "added" value, because the scope of business responsibility is not only economic, legal and ethical, but also has a general social dimension. Being socially responsible means maximizing the positive effects of business activities for all stakeholders and minimizing the negative effects. A common element of most definitions of CSR is the extension of the scope of business responsibility to the group of people interested (stakeholders) in the company's activities – not only because of their shares. According to the pyramid concept of Carroll (1991, pp. 39–48), there are four levels of corporate responsibility: economic, legal, ethical and philanthropic. The basis of business activity is therefore economic and legal responsibility – it is this responsibility that ensures the continued functioning of the organization. Other types of responsibility are regarded more as additional liabilities, activated when the business achieves the expected financial profits. Therefore, this concept is included in the *after profit obligation* group, because business engages in social activities when it fulfils its economic and legal obligations. The implementation of CSR in this model often boils down to marketing campaigns, philanthropy and charity events, which, as many researchers note, distorts the assumptions of this concept. CSR is treated as a tool for creating an image (*greenwashing*) and as a method of directing public attention away from the actual negative impact on the environment.

A different theoretical position is presented by Wood (1991, pp. 691–717). The author assumes that a company is obliged to take into account the expectations of its stakeholders, and thus adopt an appropriate attitude towards society. Unlike the model of Carroll, social action does not occur only when economic goals are met, but this action results from general social norms (*before profit obligation*). The Wood model is therefore a different version of CSR, although, as shown by Jamali and Mirshak (2007, p. 248), in a sense complementary to the model presented by Carroll. According to these authors, it is possible to combine the levels of responsibility with actions (institutional, organizational and individual ones) undertaken in response to social expectations. In this spirit, Porter and Kramer (2001) stated that business should abandon the traditional distinction between CSR models and focus on *creating shared value* (CSV). According to the creators of the CSV concept, "shared value is not social responsibility, philanthropy or sustainable development, but a new way for companies to achieve economic success". The concept is based on the assumption that economic and social progress is expressed through the creation of value, understood as the ratio of benefits to costs. It can be expressed on the business side, for example, as the ratio of service time or production efficiency to invested capital, and from the social point of view, as a change in poverty/unemployment or

waste production. CSV can therefore be understood as the simultaneous creation of business and social value or as their common part.

A business activity can therefore be combined with an activity to improve the functioning of the social environment. Creating a shareholder value can contribute to the simultaneous creation of value for other stakeholders. An example of activities on the borderline of eco-innovation and CSR is the implementation of projects in the area of supporting public health by business organizations. Activities aimed at limiting the problem of the use of tobacco products in workplaces combine the areas of prevention and solving problems related to the use of psychoactive substances, increasing the economic efficiency of the company due to the measurable, additional cost for the company. According to the research conducted in 2018 by the National Institute of Public Health (NIPH) – as part of the "Tobacco-Free Company" project – an employee who, while performing his/her duties, takes 10-minute breaks five times a day (related to tobacco addiction), works a total of 24 days less per year than his/her colleagues. In addition, companies are also burdened by the absence of employees due to diseases caused by tobacco addiction (Balwicki, 2018). Hence, compilations in the area of eco-innovation can often be characterized by CSR.

Conclusions

Building a modern economy and striving to bridge the technological gap can be achieved not only by creating competitiveness through ecological innovations and increasing the ability to absorb knowledge and new technologies, but also by inter-organizational cooperation, which is a system of mutual expectations and similar reactions in specific situations. A company implementing ecological innovations creates an innovative environment in terms of interactions between various entities, developed in the process of mutual learning, acting as a generator of innovation growth on the one hand, and social effects resulting from cooperation and mutual relations on the other hand. It should be added that openness to eco-innovative ideas originating from outside of the organization becomes a challenge for many entrepreneurs, but cooperation on creating eco-innovations does not always have to involve cooperation within a multidimensional helix. An interesting example is the alliance between the ecological organization Greenpeace and the German technology company Foron (Stafford et al., 2000).

However, it should be clearly emphasized that ecological innovations are an important element influencing the growth of innovativeness of enterprises. They are necessary to meet the requirements of environmental protection and to build economic competitiveness. The results of the study indicate that companies that take into account the ecological aspect in their activities produce new products and create pro-ecological technologies. Therefore, it can only be assumed (due to the lack of sufficient information from the surveyed enterprises) that creation and making of

eco-innovations within the helix is not only a challenge, but also becomes a practice for many entrepreneurs. The ecological perspective increases the awareness of mutual inter-organizational relations not only between science and business, but also between other participants acting in the helix model, which in the future will probably contribute to the growth of innovativeness of enterprises.

Summing up the above conclusions and considerations, the question arises in what optimal conditions for the growth of innovativeness of enterprises the multidimensional helix model works when creating eco-innovations, which can be the subject of in-depth research on innovations related to ecology and environmental protection. Further research should focus on such important aspects as identification of premises, criteria and determinants of the development of ecological innovations in the model approach in terms of the increase in innovativeness of enterprises.

References

Adamik, A. (Ed.). (2012). *Współpraca małych i średnich przedsiębiorstw. Budowanie konkurencyjności firm i regionu*. Difin.

Balwicki, Ł. (2018). *Czy palący pracownik to problem? – omówienie wyników badania CATI, konferencja pt. „Czy stać nas na palenie w pracy?”*. (Typescript).

Bień, J., Jędrzejczyk, W., & Kucęba, R. (2020). Ekoinnowacyjne potrzeby przedsiębiorstw z sektora MŚP a potencjał sieci ekoinnowacji Ecolabnet. *Przegląd Organizacji*, *3*, 12–18.

Brundlandt Commission. (1987). *Our Common Future. Report of the World Commission on Environment and Development*.

Burzyńska, D., & Hajdys, D. (2021). Determinanty i źródła finansowania ekoinnowacji w polskich przedsiębiorstwach. *Folia Oeconomica*, *1*, 63–86.

Carayannis, E.G., Barth, T.D., & Caupbel, D.F. (2012). The Quintuple Helix innovation model: Global warming as a challenge and driver for innovation. *Journal of Innovation and Entrepreneurship*, *1*. **https://doi.org/10.1186/2192-5372-1-2**

Carroll, A.B. (1991). The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders. *Business Horizons*, *34*(4), 39–48.

European Commission. (2004). *Stimulating Technologies for Sustainable Development: An Environmental Technologies Action Plan for European Union, COM (2004)38 final, 6-7*. eur-lex.europa.eu

European Commission. (2007). *Competitiveness and Innovation Framework Programme (CIP)*. ec.europa.eu/cip/

Fussler, C., & James, T. (1996). *Driving Eco-Innovation. A Break Through Discipline for Innovation and Sustainability*. Pearson Education.

GAEA. (2023). *World Business Council for Sustainable Development (WBCSD)*. gaea.bg/about-GAEA/corporate-social-responsibility.html

Gałązka, K. (2017). Ekoinnowacje jako element zrównoważonego rozwoju na przykładzie województwa lubelskiego. *Zeszyty Naukowe Politechniki Częstochowskiej, Zarządzanie*, *2*(25), 59–72.

Golińska-Pieszyńska, M. (2011). *Polskie praktyki innowacyjne. Aspekty teoretyczne i badania empiryczne*. Oficyna Wyd. SGH.

Golińska-Pieszyńska, M. (2017). Współpraca partnerska nauki i biznesu w świetle badań. *Studia Ekonomiczne Regionu Łódzkiego*, *24*, 261–270.

Jamali, D., & Mirshak, R. (2007). Corporate social responsibility (CSR): Theory and practice in a developing country context. *Journal of Business Ethics*, *72*, 248. **https://doi.org/10.1007/s10551-006-9168-4**

James, P. (2001). Towards sustainable business? In M. Charter & U. Tischner (Eds.), *Sustainable Solutions* (pp. 77–97). Routledge Taylor and Francis Group.

Kemp, R., & Pearson, P. (2007). *Final report MEI project about measuring eco-innovation*. oecd.org/env/consumption-innovation/43960830.pdf

Leydesdorff, L., & Etzkowitz, H. (2001). The transformation of university – industry – government relations. *Electronic Journal of Sociology*, *5*, 338–344.

Ministerstwo Środowiska. (2019). *Polityka ekologiczna państwa 2030*. bip.mos.gov.pl

OECD. (2010). *Eco-Innovation in Industry: Enabling Green Growth*.

Oltra, V., & Saint Jean, M. (2009). Sectoral system of environmental innovation: an application to the French automotive industry. *Technological Forecasting & Social Change*, *76*, 567–583.

Porter, M.E., & Kramer, M.R. (2011). Creating shared value. *Harvard Business Review.*

Kozmiński Business Hub. (2020). *Startupy pozytywnego wpływu*. kozminskihub.com/raport-startupy-pozytywnego-wpływu/

Rozkuta, D. (2010). *Działalność innowacyjna przedsiębiorstw w latach 2006–2009. Informacje i opracowania statystyczne*. GUS.

Stafford, E.R., Polonsky, M.J., & Hartman, C.L. (2000). Environmental NGO – Business collaboration and strategic bridging: A case analysis of the Greenpeace – Foron Alliance. *Business Strategy and the Environment*, *9*, 122–135.

Szpor, A., & Śniegocki, A. (2012). *Ekoinnowacje w Polsce. Stan obecny, bariery rozwoju, możliwości, wsparcia*. IBS.

Tomaszuk, A., & Wasiluk, A. (2021). *Przedsiębiorstwo w poczwórnej helisie*. Oficyna Wyd. Politechniki Białostockiej.

Wood, D. (1991). Corporate social performance revisited. *The Academy of Management Review*, *16*(4), 691–718. **https://doi.org/10.2307/258977**

Woźniak, L., Strojny, J., & Wojnicka, E. (2010). *Ekoinnowacje w praktyce funkcjonowania MŚP*. Warszawa: PARP.

Współpraca nauki i biznesu w aspekcie czterowymiarowej helisy a praktyka gospodarcza. (2020). (Typescript).

Zuzek, K.D. (2015). Determinanty rozwoju ekoinnowacyjności w sektorze MSP na przykładzie województwa małopolskiego. *Roczniki Naukowe Stowarzyszenia Ekonomistów i Agrobiznesu*, *17*(1).

www1: https://dionisosvine.eu

www2: https://pro-water.eu