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INTRODUCTION

Kesting, Gerstlberger and Baaken (2018) note that "increasing competition in the light of globalization imposes challenges on both academia and businesses. Universities have to compete for additional financial resources, while companies, particularly in high technology business environments, are facing a stronger pressure to innovate."

The cooperation between businessmen and enterprises with universities has positive and negative effects on the parties involved. Liu, Li and McLean's (2017) research using Spencer's "Theory of Education" presents solutions for the question, "what knowledge has the most worth?" The authors emphasize the need for education curriculum reform as well as strengthening and diversifying faculty expertise to enhance enterprise and university cooperation. These research results are a win-win for undergraduates, universities and enterprises. Cooperation can lead to innovation (Tatum, et.al., 2018).

The problem of cooperation between universities and business is often raised in literature (Epure, 2017; Gusberty and Dewes, 2017; Osipova, et.al., 2019). Pena and Ballesteros (2016) brings attention to "the gulf that exists between the academic system and the needs of businesses" and highlight "the lack of a genuine climate of cooperation as identified as one of the causes". Meanwhile, empirical research often focuses on commercializing research only (Kesting et. al., 2018; Lavarello, 2017; Mikosz and de Lima, 2018; Riberio and Nagano, 2018).

As noted by Raesfeld and Fuentes (2018), "technological advances are strongly influenced by a set of external and internal factors related to the environment as well as its structural and organizational characteristics" which result in an innovation system and advances within the organization. The specificity of the environment, legal conditions as well as cultural and social factors result in systemic solutions. These solutions may be financial or the implementation of scientific and research works (Czerwinska et al. 2019). However, the solutions developed in other countries or recommendations addressed to specific enterprises may not be directly transferable. Similarly, universities operating under different circumstances or considering the specifics of a problem, especially from a legal perspective, may not be transferable. The transferability issue as occurred recently in Poland. This issue has occurred despite numerous studies in the field of university-business cooperation. Therefore, it is worth continuing scientific research in this area.

The intent of this article is an analysis of the model of cooperation between enterprises and universities in Poland and the United States (USA) from a business perspective. The article focuses on selected determinants of enterprises university cooperation. These determinants include the types of cooperation as well as motivations for cooperation and the barriers affecting cooperation. The following thesis has been formulated: There are differences between the model of business-university cooperation in Poland and the USA. Cooperation between enterprises and universities is crucial to knowledge transfer and innovation. It is important for economic growth, social growth and the development of the country (Riberio and Nagano, 2018) and the region (Epure, 2017). According to The Global Competitiveness Report 2018 and Swiss-based International Institute for Management Development (IMD) World Competitiveness Yearbook ranking (2019), the USA is one of the best countries in the world in terms of economic competitiveness (Schwab, 2018; IMD World Competitiveness Yearbook, 2019). The USA is also at the forefront of countries in the indicator, "university-industry collaboration in research and development (R&D)" (Schwab, 2017). The experience of USA enterprises can be used as a background for considerations about cooperation between business and science in Poland, and as an example of good practices for the purpose of supporting and improving the analyzed relationships. (Czerwińska-Lubszczyk et. al., 2019).

THEORETICAL BACKGROUND

University-business Cooperation could be defined as "a model of inter-institutional arrangement between organizations of a fundamentally distinct nature, which may have different purposes and adopt vastly different formats" (Tatum et.al., 2018). Raesfeld and Fuentes (2018) draw attention to formal and informal relationships and interactions between the partners in the cooperation. Mussi (2016) studied collaboration in which the university is one of the parties involved. It was found that there were differences according to the type of

partner which the academic institutions are involved with according to facilitators, barriers, motivators, and determinants for the interinstitutional cooperation.

Area of Cooperation: Researchers focusing on cooperation between universities and enterprises focus on one area or analyze many possibilities. D'Este and Patel are focused on the following: exchanges of personnel, joint research, joint patents and publications, applying for licensing, opening of spin-off companies or laboratories. They also emphasize the importance of that joint cooperation through informal meetings or participation in conferences (Kuna-Marszałek 2013b). Derek Gill et al. stated that this cooperation can also be brought about through the following: internships for graduates, sending university faculty to spend time in industry or inviting industrial specialists to university laboratories (Kuna-Marszałek 2013a).

Fajfer, Koliński, Kolińska (2013) in their research conducted among Polish enterprises mentioned many areas of these types of cooperation between business and science. Cooperation in training personnel turned out to be the most common type of cooperation. Cooperation in the field of jointly implemented projects was also of great importance. Based on the results of empirical research conducted in Mexico (Raesfeld and Fuentes, 2018), the cooperation between enterprises and universities is usually focused on student internships. Other forms of cooperation mentioned are staff exchange as well as research and development cooperation. However, the authors emphasize the sporadic nature of these activities and the lack of continuity in their initiatives.

Motivation to Cooperation: Kesting, Gerstlberger and Baaken (2018) researched the textile industries in Germany, the Netherlands and Belgium. Their research identified twelve benefits as a result of cooperation e.g.: acquisition of new knowledge, product optimization, improvement of the innovative ability, cost reduction and potential recruitment of qualified graduates/doctoral candidates.

The benefits associated with the acquisition of new knowledge turned out to be of the highest importance for the surveyed enterprises. The authors divided the research sample according to the size of enterprises. It turned out that the larger the company, the more often it cooperated with universities.

At the same time, de Conto and Feil (2017) emphasize that cooperation is of "fundamental importance in preparing micro and small businesses for competition of large national and international companies". Cooperation is a "way to enable the development of new businesses and new technologies". The survey conducted among Brazilian companies shows that access to university infrastructure is the main motivator to cooperate with the scientific community.

Jakubiak and Chrapowicki (2017) studied the cooperation of enterprises with the university in Poland from the perspective of implementing innovative products. They focused on the commercialization of research results. Based on interviews

with entrepreneurs and scientists, they listed factors facilitating the establishment and implementation of cooperation e.g.: previous contacts between scientists and company representatives, mutual interest of cooperation resulting from the profile of the company and area of expertise and research of the scientists or both parties have to be convinced that cooperation is worth establishing, because it can bring benefits to both parties.

Barriers of Cooperation: Cooperation between enterprises and universities is associated with a wide range of barriers. Empirical research conducted in Mexico by Raesfeld and Fuentes (2018) focused on barriers, such as not seeing the benefits of cooperation (on both sides), difficulty in finding a suitable partner or differences that result from the manner of communication.

Gajewska and Kurowska-Pysz (2012) indicated a wide range of barriers (occurring on the side of Polish businesses) inhibited the process of knowledge transfer from universities to business. Some of those barriers included the following: lack of capital for the development of research and other related activities, lack of staff competence to assimilate knowledge obtained through cooperation with the academic community, lack of staff to use the knowledge obtained to strengthen the company's innovative potential or stereotypical perception of cooperation with the university as costly and of little use, preferring to acquire ready solutions, without incurring excessive risk.

Based on interviews with entrepreneurs and scientists, Jakubiak and Chrapowicki (2017) pointed out the difficulties encountered by respondents during the implementation of innovative projects. The main barrier highlighted by all respondents was financial difficulty in enterprises. The respondents also emphasized the difficulties arising from the specificity of implemented projects.

METHODOLOGY OF RESEARCH

The aim of the paper is analysis of the model of cooperation between enterprises and universities in Poland and the USA from a business perspective. The article focuses on selected determinants of enterprises-university cooperation, such as areas of cooperation as well as motivations and barriers for cooperation.

The following research objectives were formulated as follows:

- Identification of the areas of business-university cooperation in Poland and the USA;
- Identifying motivators for business-university cooperation in Poland and the USA;
- Identifying barriers to business-university cooperation in Poland and the USA.

The following thesis has been formulated for the indicated research objectives.

- There are differences between the model of business-university cooperation in Poland and the USA.

The interview questionnaire was developed on the basis of literature analysis and the tools included in research and publications related to university-business cooperation. In depth individual interviews were conducted in Poland and the USA using a questionnaire as a research tool.

Criteria for selecting respondents were as follows:

- Diversity criterion: various size of enterprises, (micro-enterprises, small and medium enterprises); position of respondents, (owner, president, manager, engineer); length of business-university experiences;
- Effectiveness criterion – people with experience in cooperation with the university;
- Accessibility criterion – willingness of the respondents to give an interview and physical possibility, time and place.

These interviews were carried out from August to October 2019.

RESULTS

The research sample consists of fifteen business representatives, eight from Poland, seven from the USA. Table 1 contains the sample structure in terms of criteria, such as the respondent's positions, their experience in cooperation with the university and the size of the company they represent. Targeted selection of enterprises was used so that respondents occupy various positions in enterprises, have different lengths of experience in cooperation with universities and represent enterprises diversified in terms of employment, which was defined as the number of employees per year in full-time equivalents. People working part-time or have not worked the full year (e.g. seasonal workers employed under fixed-term contracts) should be expressed as a fractional value. Persons employed on the basis of a mandated contract or a specific task, such as engaged in military service, on maternity or parental leave, as well as apprentices and trainees are not included (Commission Regulation EU, 2014).

Table 1 Sample structure

Position of respondents	PL (Number)	USA (Number)
Owner	3	4
President	2	2
Manager	2	1
Engineer	1	0
Total	8	7
Experience in cooperation (Number of years)		
0-5 years	2	4
5-10 years	3	2
10-15 years	1	1
15-20 years	2	0
Total	8	7
Size of enterprises (Number of employees)		
1-9	2	3
10-49	3	2
50-249	3	2
Total	8	7

Respondents focused on different areas of cooperation (Table 2). Respondents in Poland most often mentioned areas of cooperation, such as research and development (R&D) as well as apprenticeships and/or internships for students and/or graduates. Respondents in the USA focused mainly on research and development as well as consultations with university faculty.

Table 2 Areas of cooperation in Poland and USA

Items of areas of cooperation	PL	USA
	Number	Number
Research and development	7	7
Apprenticeships and/or internships for students and/or graduates	7	4
Preparation of expert opinions by university faculty	4	1
University faculty working for industry	4	2
Participation in conferences and informal meetings with university faculty	3	2
Consultations with university faculty	0	7

Polish respondents also mentioned the following:

- Conducting joint projects financed by the European Union (EU) and The National Centre for Research and Development (NCBiR) funds (4 people);
- Cooperation within the cluster (2 people);
- Conducting classes at the university (2 people);
- Other: participation in job fairs and financial support of the research club (2 people).

Factors motivating cooperation between enterprises and universities were evaluated by respondents on a 5-point scale where:

- 1 - Definitely disagree with the given statement;
- 2 - Somewhat disagree with the given statement;
- 3 - No opinion with the given statement;
- 4 - Somewhat agree with the given statement;
- 5 - Definitely agree with the given statement.

The wording took the following form: "My cooperation with university is motivated by: ...".

The results are shown in Table 3.

Polish respondents stressed the importance of such motivators as the need for assistance in the development of the manufacturing technology for a new product, the need for assistance in implementing new technology and the need for assistance in developing marketing strategies.

Respondents from the USA focused up on the need for assistance in modifying an existing product, the development of a new product, the implementation of total quality management, the development of a website for online sales and the need for assistance in complying with environmental standards.

Table 3 Motivations for cooperation in Poland and USA

Items of motivation to cooperation	PL	USA
	D	D
The need for assistance in the development of the manufacturing technology for a new product	5	3
The need for assistance in implementing new technology	5	4
The need for assistance in developing marketing strategies	5	3
The need for assistance in modifying an existing product	4(M)	5
The need for assistance in the implementation of total quality management	3	5
The need for assistance in the development of the website for internet sales	3	5
The need for assistance in the development of promotional/advertising materials	3(M)	3
The need for assistance in the development of a new product	3(M)	5
The need for structural analysis of a new or modified product	3(M)	3
The need for assistance in the implementation of the ISO standards	2	4(M)
The need for assistance in complying with environmental standards	1	5

Key:

D – dominant

M – median

Note: Dominant (D) was used. In the absence of a dominant (D), the median (M) was used.

Barriers to cooperation were evaluated by scientists on a 5-point scale, where,

1 – Definitely disagree with the given statement;

2 – Somewhat disagree with the given statement;

3 – No opinion with the given statement;

4 – Somewhat agree with the given statement;

5 – Definitely agree with the given statement.

The wording took the following form: "I see the following barriers to university and business cooperation in Poland (USA) ...".

The results are shown in Table 4.

Table 4 Barriers to cooperation in Poland and USA

Items of barriers of cooperation	PL	USA
	D	D
Too busy schedule	5	4
Lack of financial resources	5	5
Lack of cohesive marketing of industry-university cooperation	5	3
High-cost factor of industry and university projects (Lack of competitiveness)	5	5
Lack of adequate laboratories to conduct research and development projects	5	3
Too complicated bureaucracies and formal procedures while conducting industry-university projects	5	3
Lack of faculty experience in conducting university and industry projects	5	3
Too much concentration on routine manufacturing	3(M)	5
Too much focus on clerical and organizational work	1	5
Improper criteria for the performance assessment of management personnel	1	4
Lack of knowledge about the opportunities of working with different universities	1	3

Key:

D – dominant

M – median

Note: Dominant (D) was used. In the absence of a dominant (D), the median (M) was used.

Polish respondents rated the barriers to cooperation with universities rather highly (Dominant 5 appeared more often). Interesting is fact of the rather low barriers in the following: too much focus on clerical and organizational work,

improper criteria for the performance assessment of management personnel and lack of knowledge about the opportunities of working with different universities.

Both in Poland and the USA respondents paid attention to financial issues (lack of financial resources) and the cost competitiveness of the university compared to the cost of hiring consulting companies.

DISCUSSION AND CONCLUSION

The aim of the paper is an analysis of the model of cooperation between enterprises and universities in Poland and the USA from a business perspective. The article focuses on selected determinants of enterprises-university cooperation, such as areas of cooperation as well as motivations and barriers for cooperation. The results of the research showed differences between the models of university and business cooperation in Poland and the USA.

The small sample size encourages careful formulation of conclusions about business-university cooperation. It is also necessary to pay attention to the differences in the environment in which the business-university cooperation occurs, e.g. the political, economic, social, technological and ecological factors (Czerwińska, et al., 2019).

When planning future research of an international nature, it is possible to take into account a larger number of aspects of cooperation between companies and universities. It is also worth considering the holistic approach including the role of government and the third sector, the quadruple helix model (Riberio and Nagano, 2018; Tatum et. al., 2018). It is also worth taking into account the suggestions of Mussi (2016), who notes that the university as one of the parties to cooperation can be analyzed at the institutional or individual (employee-scientist) level, while businesses can not only be analyzed from the perspective of individual enterprises, but also from the perspective of their groups or associations.

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Abstract: The aim of the paper is an analysis of cooperation between enterprises and universities from a business perspective in Poland and the United States (USA). The article focuses on selected determinants from a business perspective. The determinants of the enterprises and university cooperation included areas of cooperation as well as the motivations and barriers for cooperation. Extended interviews were conducted in Poland and the USA using a questionnaire as the research tool. The results of the research showed differences between the enterprises and universities cooperation in Poland and the USA.

Keywords: cooperation, business and university