

Identifying Barriers to Science-Business Interaction

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Abstract

The aim of the paper is to identify and summarize insights of different authors into barriers to science-business interaction and ways of removing them. Based on identified groups of interaction barriers, analysis of field research conducted by using the method of expert evaluation that involved experts from the UK, Germany, Sweden and Lithuania, is presented in the paper. Based on results of the analysis practical ways of breaking down barriers to science-business interaction are proposed.

Keywords: science-business interaction, interaction barriers, science-business collaboration, removing barriers, university, company.

Introduction

Novelty and relevance of the article. Collaboration between science and research organisations (henceforth SRO) and business sector organisations (henceforth BSO) is a process when two or more parties express willingness to work together towards common benefit. This relationship may be short-term or long-term, take one or more forms and comprise one or more activities (Cibulskiene et al., 2010). Research and its applicability opportunities are important for business performance. From this standpoint the process of collaboration between SRO and BSO can be understood as an exchange of knowledge, innovations, outcomes, etc. due to ongoing interactions and feedback in communication. To review and evaluate the process of collaboration let us assume that the main problem in collaboration relates to a specific systemic logic of the process with its particular language and a characteristic system of goals (von Ertel, 1987; Kröcher, 2005, cited by Cibulskiene et al., 2010). Collaboration processes between SRO and BSO depend on various conditions (Beier, Edlich, 2007, cited by Cibulskiene et al., 2010) which can also be defined as a base on which science-business interaction barriers are built. It is presented in scientific literature that specific features of each partner's corporate culture, mission, policy, goals, structure, norms and values and differences determined by them hinder science-business collaboration. Therefore, it is important to systematize science-business interaction barriers and wa-

ys of breaking them down as presented in foreign and Lithuanian scientific literature. Because of these barriers interaction between science and business organisations either fails, collaboration is blocked, or does not exist at all.

Research subject: Barriers to science-business interaction and ways of removing them.

Research aim: According to theoretically identified groups of barriers to science-business interaction and ways of removing them to determine interaction barriers built in practice.

Research objectives:

1. to review the theoretical aspects of barriers to science-business interaction and decisions on removing them,
2. to put forward the practical aspects of the main barriers to science-business interaction and ways of removing them.

Research methods: analysis and systematization of management literature by using the methods of classification, simplification, interview and interpretation.

Theoretical aspects of arising SRO-BSO interaction barriers

Collaboration between SRO and BSO occurs when various conditions are present: they can either promote the process or be insufficient for it to occur. In any case conditions for collaboration cannot be analysed separately (Beier, Edlich, 2007, cited by Cibulskiene et al., 2010).

The generalisation of scientific literature allows identifying the following **conditions** for effective SRO and BSO collaboration in the region: mutual trust; geographical location, i.e. distance between science institutions and business organisations; partners' motivation to collaborate; corporate culture; organisational structure; the body of knowledge in business organisations; expertise; selection of interaction channels; culture of conduct of partners. It should be noted that many authors consider that mutual trust is an essential condition for collaboration, a lack of which makes collaboration impossible (Schar-

tinger, Rammer, Fischer, Fröhlich, 2002; Fontana et al., 2005; Hofer, 2006; Hagen, 2006; Bramwell, Wolfe, 2008, cited by Cibulskiene et al., 2010). SRO and BSO collaboration processes depend on these conditions (Beier, Edlich, 2007, cited by Cibulskiene et al., 2010) which can also be understood as a base for SRO-BSO interaction barriers to arise.

Specific and common problems that hinder science-business interaction or even make it impossible are summarised in Fig. 1.

One of the most critical interaction problems attributed to *science and research organisations* is

low applicability of academic research findings to the development of new products and services (Orbanić et al., 2006). Bergman (2010) and D’Este, Perkmann (2010) state that “academic interests are generally irrelevant to more application-oriented interests of firms” therefore if academics do not see a clear benefit for their work and career they are not interested in the opportunities that could arise from close collaboration with the industry. It should be admitted that companies are much more “interested in collaborating on applied science, especially in disciplines like materials and computer science” (Bodas Freitas, Geuna, Rossi, 2010, p. 19).

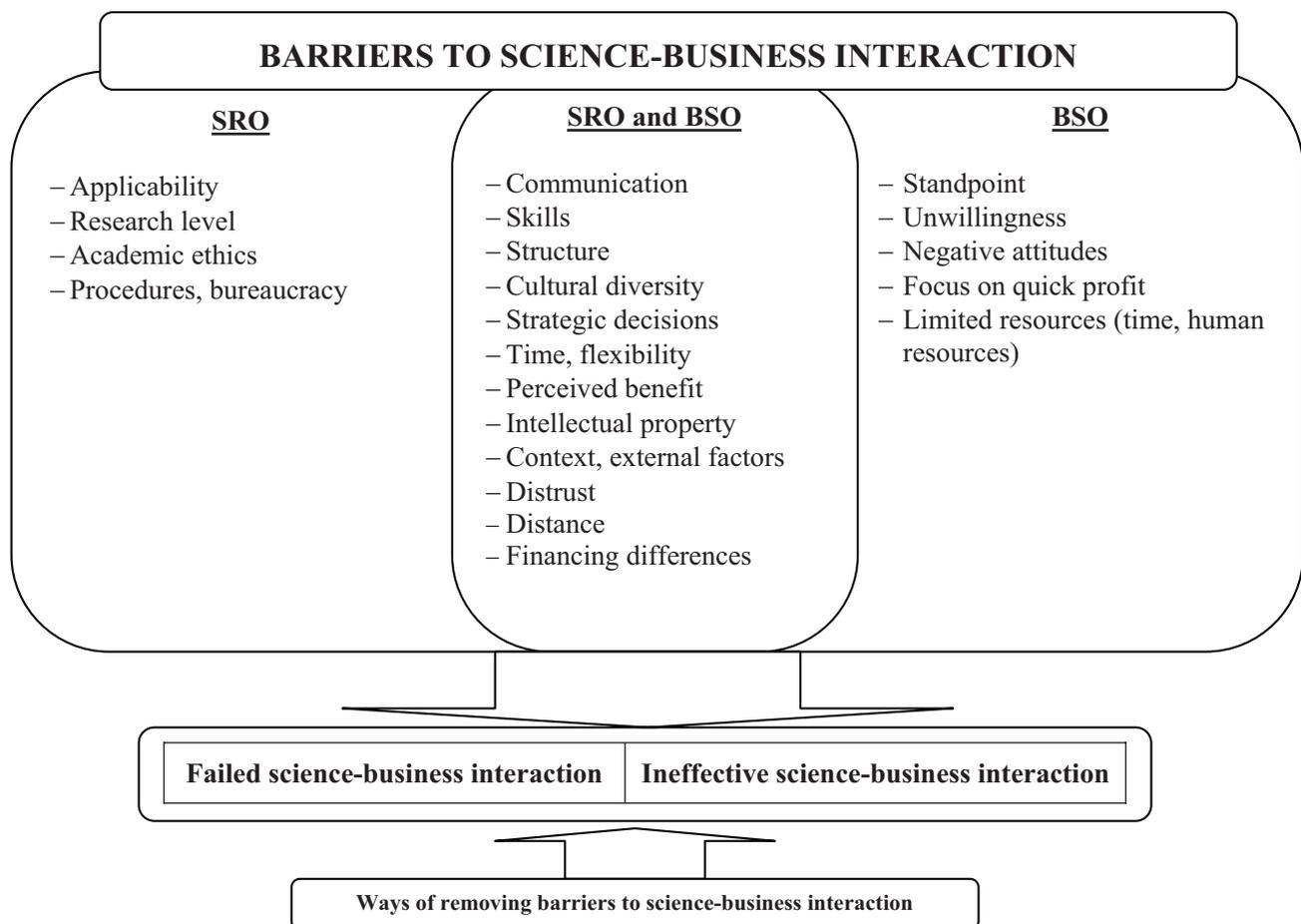


Fig. 1. Identified barriers to science-business interaction

Source: compiled by the authors

Opportunities to initiate science-business collaboration relate to the *research level* of a particular higher education institution and that, according to Bodas Freitas et al. (2010, p. 21), together with the amounts of industry financing received, is qualified as predictors of the involvement of scientists with industry. Weak science-business interaction results from a low mobility of academic staff and their limited involvement in various projects and activities of the governmental and non-governmental sector. Academic staff

have little information, experience and skills to deal with problems (Lakis, 2011).

Although it is often stressed that a part of the academics’ role is to publish high quality papers in academic journals and to achieve outputs accessible to practitioners (Thorpe, Eden, Bessant, Ellwood, 2011), however, according to Kiskiene (2009), science institutions are criticised for partiality, commercialism, non-compliance with academic ethics, withdrawal from their primary functions and disregarding the

public interest in knowledge and technology transfer from public, state institutions to businesses.

As it is pointed out in the publications of various authors (Kalpazidou Schmidt, 2008 cited by Cibulskiene et al., 2010; D'Este, Perkmann, 2010; Salter, Tartari, D'Este, Neely, 2010), an assumption can be made that time-consuming decision making and legitimating processes, complicated bureaucratic requirements on the part of science institutions, absence of established procedures to collaborate with industry and a lack of strategic planning in public research allows singling out *procedural, bureaucratic* barriers as one of most deep-rooted in SRO and seriously hindering collaboration with business organisations.

Another group of barriers to science-business interaction relates to problems in **business organisations**. There a typical business organisations' *focus on profit* and related *attitudes* should be singled out. Orbanić et al. (2006) cited by Cibulskiene et al. (2010) see too big profit-related expectations as one of likely problems. Kalpazidou Schmidt (2008) cited by the authors of the same study (Cibulskiene et al., 2010) supports the idea that by linking efforts to get the highest profit in the shortest time is a high risk. While businesses are focusing on short-term research (Salter et al., 2010), they face difficulties in finding companies with an appropriate profile (e.g. highly innovative partners) but take time in seeking for them among science institutions because of a widespread negative attitude towards their activities and research outcomes (Meißner, 2001, cited by Cibulskiene et al., 2010). *Limited resources* (time, human, financial) prevent from building and developing close relationships between business and science organisations. The shortage of skilled and professional staff capable of collaborating with science and research institutions should be also emphasised (Salter et al., 2010).

Problems characteristic of both, **science and business organisations**, make up the greatest group of barriers to science-business interaction; much time, many efforts and other resources are needed to solve them. Barriers that arise from *communication* are one of them, i.e. insufficient knowledge and outcomes dissemination (Češnovar, 2006), a lack of understanding about collaboration opportunities and potential benefits from it (Cibulskiene et al., 2010), efforts of industry to delay dissemination of research outcomes and publications (Salter et al., 2010; Haeussler, 2011). Asymmetric information, according to Grimpe, Kaiser (2010), highlights a lack of the required expertise the partners have declared to possess. Moreover, explaining asymmetric information, the importance of staff is stressed because the time each individual devotes to tasks becomes more critically important and staff often has limited time to fulfil multifunctional roles (Huang, Chang, Henderson, 2008).

Another limitation characteristic of both sector organisations is a *lack of the required skills*. It means that business organisations lack competencies to adopt innovations or implement organisational changes, they are reluctant or even fearful to employ the potential of young staff (Kvedaravicius, Dagyte, 2007), are incompetent to define the required knowledge and lack technological competence (Iqbal, Khan, Iqbal, Senin, 2011). It should be noted that science organisations are also lacking skills and information resources to monitor and conduct negotiations with business organisations. Availability of the required competences and information resources could help to create conditions to identify and meet mutual interests, negotiate contracts and mediate knowledge and technology transfer to companies or develop products (Cibulskiene et al., 2010).

Scientific literature (e. g. Perkmann, Neely, Walsh, 2011) acknowledges that the *structural differences* in partner organisations also cause quite a number of problems linked with efforts to publish *versus* to delay publishing and focus on long-term *versus* short-term research analysed above. Thus an organisational structure is understood as a factor that influences the culture of science-business interactions through adopted rules and norms.

The group *cultural diversity* (*vision, goals, interests, needs, etc.*) also causes various problems in the real world, a gap between scientific and industrial communities develops and that heightens tension or blocks knowledge and technology transfer processes altogether (Ryan, Heim, 1997; Iqbal et al., 2011; Perkmann et al., 2011). Even more, confrontation of business and science organisations' goals neither boosts *mutual trust* between these communities nor inspires collaboration appreciation (Kiskiēne, 2009; Salter et al., 2010). The concept of cultural distance defined as "the sum of factors creating, on the one hand, a need for knowledge and, on the other hand, barriers to knowledge flow and hence also for other flows between the home and the target countries" is worth mentioning here (Kohlbacher, Krähe, 2007). This group also closely relates to different strategic solutions which, according to Cibulskiene et al. (2010), when the choices of public and private organisations are compared, can be understood as a result of differences in their institutional framework.

The analysis of science-business interaction barriers allows stating that on the part of business organisations collaboration is considered to be a risky undertaking in general (Kiskiēne, 2009; Fink, Kessler, 2010) because of the *shortage of the required staff, a lack of time* and *vagueness* (Ren, 2009; Krabel, Boente, Audretsch, 2010). If academics take time to publish their research outcomes without concerning towards market conditions and expectations

of the industry, then industries usually require immediate solution of their problem and are not ready to wait until the result of a particular research is available. Any specific time from the academic world to the firm means lost investment and income (Iqbal et al., 2011).

Scientific literature analysis allows noticing that *awareness of the mutual benefit* means that the problem of interaction between organisations has been solved: “the offering party must be sure of the likely benefit and the accepting party must have knowledge and skills to do something more than to lecture in the university. The offering party must trust the competencies of the accepting party” (Lakis, 2011). That means awareness of a clear return on investment: the number of jobs saved or created, the number of new products or businesses developed, or productivity enhancements (Ryan, Heim, 1997). According to Hall, Link, Scott (2001), a lack of understanding (on the part of firms and universities) regarding corporate, university and scientific norms and environments may become the most significant barrier to industry-university interaction.

Problems related to *intellectual property* (patenting, licensing, commercialization) rights and management are attributed to the group of common barriers in research works (Orbanić et al., 2006; Perkmann, Walsh, 2007; Salter et al., 2010; Iqbal et al., 2011), they relate to conflicts over intellectual property, i.e. likely conflicts with universities over financial payments for patents and other intellectual property rights; confidentiality concerns; rules and regulations imposed by universities or state-funded agencies; absence or low competence of divisions for academia-industry relations (Bruneel, D’Este, Salter, 2010). According to Hall et al. (2001), problems related to intellectual property are an insurmountable barrier.

An even wider context of science-business interaction problems could be related to the factors of the external environment and particularly to a rapidly changing legal environment (Kvedaravicius, Dagyte, 2007; D’Este, Perkmann, 2010; Salter et al., 2010; Perkmann et al., 2011). According to the authors, rules and regulations imposed by a university or a government funded agency or a lack of suitable government programmes become a serious barrier to partnership development between organisations.

According to Damkuvienė (2009), trust is interpreted as anticipation, a belief and an expectation that both parties can trust the partner’s intentions and promises. Consequently, speaking about *distrust* between science and business organisations as one of interaction barriers it should be noted that “inter-organizational relationships can only be explained through trust-based behavioural coordination” (Dyer, Hatch, 2006; Kohlbacher, Krähe, 2007; Fink, Kessler, 2010).

As said by Bruneel et al. (2010), who have summed up the ideas of many authors in their study on inter-organisational trust, it could be stated that trust can help to reduce the fears that one of the partners will act opportunistically, allows partners to be confident that their collaborator will treat them fairly and in a consistent way and will help to resolve any problems that may arise jointly.

Discussing cultural diversity cultural distance as a potential danger for building successful business-science interactions has been mentioned (Bergman, 2010; D’Este, Iammarino, 2010) but the impact of *geographical distance* on relationships between organisations must be also highlighted. Clifton, Keast, Pickernell, Senior (2010) point out that “businesses interested in supporting frontier research at universities are likely to look widely for the best suited university partners, regardless of location” and stress that “for business-university collaborations physical proximity is important for SMEs”, businesses based close to universities particularly benefit from knowledge spill-over.

A frequent restraint is a *lack of mutual information about potential partners and interaction opportunities*, i.e. a lack of collaboration skills and competences when it is of great importance to be familiar with the academic and business environments. Interaction supporters could be involved with the academic or business environments. They would know what kind of information is available; they could communicate a message through their organisation’s channels and act as “mediators between contacts and knowledge” (Tushman, Katz, 1980, cited by Cibulskiene et al., 2010). What characterises them best is their ability to network and keep up informal relations with the partner staff (Sosa, Eppinger, Pich, McKendrick, Stout, 2002, cited by Cibulskiene et al., 2010). Other critical barriers identified in the research works of various authors are as follows: *bureaucracy and rigidity of university administration, unclear financial reward for joint work, undetermined resources, the partner’s unwillingness to compensate research expenses, a failure to reach consensus over deadlines, a lack of marketing, technical, negotiation, sales and management skills* (Cosh, Hughes, Lester, 2006; Abreu, Grinevich, Hughes, Kitson, 2009, cited by Cibulskiene et al., 2010).

Last (but not least) identified common barrier to interaction is *funds and financial difficulties*. As Iqbal et al. (2011, p. 65) point out, “university needs funds and equipment from the industry to continue their research, and the life of their research is highly dependent on the financial support from the industry and the government. This stringent perception of the industry always creates problems in collaboration. Funds, grants, endowments, scholarships and intern-

ships are not only providing assistance to the researcher but are also the best success criteria of university-industry collaboration. Financial support is the one exclusive metric that can motivate researchers to work with the industry in an open, positive and friendly environment”.

Theoretical aspects of removing SRO-BSO interaction barriers

If the benefits from SRO-BSO interaction are acknowledged, the ways of interaction building or making it more effective must to be sought for. Iqbal et al. (2011) emphasise that three mechanisms of removing barriers to university-industry interaction exist: *experience in collaboration, a variety of interaction channels and mutual trust*. According to the authors, it is important “that firms learn to work across organizational boundaries, but also they have or can build capabilities to collaborate with partners operating within a different incentive system. <...> Collaborating with a university partner necessitates that firms develop operating routines and practices to manage this collaboration. <...> Establishing expectations about when and in what form the results from a joint research project will be published may be controversial, for example”.

Taking into consideration that business opinion about inter-organisational collaboration has been changing (Perkmann et al., 2011), universities’ efforts to strengthen collaboration with businesses are noticeable – *specialised centres* (for knowledge/technology transfer) are set up; their aim would be “to create such a calm environment where they can work together patiently and smoothly. The basic collaboration process between academia and industry usually starts with each party identifying what can possibly be acquired from the alliance and the potential needs of the other party. The strategy to develop the joint venture requires that both partners must have to organize the chart for identifying their basic needs and recognizing their mission” (Iqbal et al., 2011) thus raising the awareness of the culture and activities of the partner organisation from another sector.

According to Veugelers (1998); Kvedaravičius, Dągys (2007) and Kalpazidou Schmidt (2008) cited by Cibulskiene et al. (2010), in order to minimize interaction barriers activities for each partner organisation should be defined. *Business organisations* should direct their activities towards management improvement, processes / manufacturing coordination, search for pro-active knowledge, promotion of formal / informal communication, awareness of the norms and activities of the public sector raising, mutual interest and trust through informal contacts building, orientation on objectively beneficial outcomes and equal opportunities. Moreover, business organi-

sations’ efforts to sign agreements of aligned intent, reconcile the structure of ownership, select partners, manage information transfer between loyal partners and develop long-term relationships should be emphasised. Meanwhile *science organisations* should focus on the development of new skills necessary for companies, initiation of cross-sectorial networks, science areas of high economic value, linking strategic planning with priority research areas, the development of an all-inclusive communication system for easy access to research (*know-how* and *know-who*), the development of research management and technology transfer systems, mechanisms and competences, market orientation and marketing skills training and setting up a framework for intellectual property and publishing rights in cooperation with companies.

Practical aspects of arising SRO-BSO interaction barriers

Based on the theoretically defined and identified groups of science-business interaction barriers the aim of the paper is to identify those arising in practice. A part of qualitative research, an interview with experts in science-business interaction problems from Germany, the UK, Sweden and Lithuania, conducted by Cibulskiene et al. (2010) is presented in the paper. This qualitative interview is presented by highlighting three different groups of interaction problems, i.e. based on the theoretical assumption that science-business interaction problems are of various character caused by the peculiarities of and differences in the culture and principles of activities of science and business organisations. Survey participants: 2 experts from the UK (Nathan Burgess, Andrew Sirs-Davies), 3 from Germany (Iris Hetz, Jörg Frorath, Dr. Heike Krömker) and 1 from Sweden (Tobias Dahlberg) (Cibulskiene et al., 2010). Also, the analysis of a fragment of a recorded interview “*Science-business Cooperation: the Mandatory Evil?*” (in German: *Kooperation zwischen Wissenschaft und Wirtschaft: notwendiges Übel?*, 2011-08-23, 19:40) on the German radio website deketor.fm presented by Johanna Wilimsky, was performed. Interviewees: experts from Germany, i.e. Winfried Holzapfel, CEO of the Society for Academic Freedom Germany (in German: *Bund Freiheit der Wissenschaft*), and Melanie Schneider from Sponsors’ Association for Science in Germany (in German: *Stifterverband für die deutsche Wissenschaft*). Businessmen’s from Šiauliai region views expressed in the round-table discussion “Collaboration between Science and Research Organisations and the Business Sector in the Region” (2010-09-29) are also included (Cibulskiene et al., 2010).

The interviewed experts identified the following interaction barriers arising due to the specificity of *science and research organisations*: low appli-

cability of research outcomes to practice, problems with academic ethics, interest opposition of researchers from different science areas and fields, focus on long-term research. Theoretical insights were supported by the fact that, on the part of science, on the one hand, “the academism” of universities builds opposition to science-business collaboration. Nathan Burgess, expert from the UK, said: “... it happens often-times that academics become too theory-minded and lose touch with organisations“. On the other hand, over-commercialization of research findings and secret agreements between science and business organisations has been rather actively discussed recently. Dr. Heike Krömker, expert from Germany, claimed that “...scientists disapprove science over-commercialization, businesses set too short timelines for scientists, and their focus on business needs limits the space for scientific interpretations...“. **Winfried Holzappel also raised the issue of business favouritism in the interview on German radio** deketor.fm. He said that “when the university receives financial support it must seriously consider whether that agrees with the university mission: researchers cannot guarantee research results nor can they be biased, financial support does not mean to please business, science institutions must stand firm in these matters and conduct research irrespective of money”.

The analysis of the interview with Winfried Holzappel allows identifying one of the main interaction problems, the issue of *academic ethics* as it often-times relates to financing sources. It is necessary to get financial support from private sources to launch a project. But financial support from private sources, the so-called “the mandatory evil”, oftentimes is interpreted as a danger for academic freedom. Melanie Schneider from Sponsors’ Association for Science in Germany also stressed the issue of academic ethics: “I think that science, no matter whether it is financed from private or public sources must foster academic freedom, science and research freedom is protected by law in Germany”. The interview showed that Sponsors’ Association for Science in Germany has adopted regulations that must be considered signing a science-business partnership agreement. The main criteria are as follows: university autonomy, science and research freedom and the transparency of contracts and research sponsors. Melanie Schneider said that “research-business collaboration should be to the advantage of both, businessmen and researchers. Everything should be defined and made public: what we are doing, why we are doing that, all that should be showed, fixed in writing and thus made clear that we reject influence”.

The interview analysis showed that *opposition of scientists from different science areas and fields* foremost hinders the process of collaboration initiation.

The experts from the UK said that “engineers believe that they are ignorant in social sciences, they don’t understand that they could cooperate” (Nathan Burgess). “...they underrate these sciences. That’s a big problem...” (Andrew Sirs-Davies).

As it has been pointed out in the theoretical part of the paper, many authors claim that the main condition for collaboration is *mutual trust*. Tobias Dahlberg, expert from Science Park Jönköping, Sweden, said that “a lack of mutual trust could be an obstacle in the early stage”. The businessmen from Šiauliai region also expressed concern about information disclosure in joint projects (Cibulskiene et al., 2010).

Qualitative research results also highlighted common problems in science-business interaction. The experts from Germany said that the *focus on long-term research* on the part of science and the *focus on quick results* of a limited need, i.e. the *focus on quick profit* on the part of business also hinder science-business collaboration. *Time management* as one of science-business interaction problems is highlighted in the theoretical insights of various researchers. Salter, Bruneel, D’Este (2009, cited by Cibulskiene et al., 2010) claim that business considers scientists’ focus on long-term research to be the main barrier to science-business collaboration: 69% of SRO staff and 59% of big companies’ staff highlighted that. Higher Education Funding Council for England declares that the set terms and higher education programs must be followed. Thus universities working towards science-business partnership development face one more barrier, e.g. they cannot take a bigger share of the education market (Employer engagement funded..., 2010, cited by Cibulskiene et al., 2010). Winfried Holzappel, CEO of the Society for Academic Freedom Germany, added to these theoretical insights by saying that “...certainly, there are good examples of science (higher institution)-business alliances where a smooth knowledge transfer is ensured, a distance between science/university and business is shortened as it’s possible, e.g. an invention is put into mass production faster”. In the businessmen’s from Šiauliai region opinion: “...Businesses need to get problem solutions and answers straightaway, meanwhile academic institutions are unable to react promptly enough...”.

Interview results showed that science and business organisations differently understand the *outcomes of collaborative interactions*. Winfried Holzappel said that “Science cannot guarantee results because research outcomes are open, not to do a favour for the sponsor. It means that the goal of research is to get to the core of the research object and to find the best (in terms of science) solution. Universities and higher education institutions are research and education institutions. Students engaged in research work must have an opportunity to develop and advance, not to serve business”.

Business organisations' clear focus on profit was highlighted in the interviews. Business organisations are openly saying that research must bring financial benefit. Businesses avoid collaboration with higher education institutions: "...the project is interesting but is of no real value for our organisation, the organisation cannot make a commitment <...> Businessmen ignore research initiatives <...> if they are of no financial value, i.e. commercial value even in social sciences..." (Nathan Burgess).

The analysis of the interviews with the experts showed that one of the factors that cause the arousal of science-business interaction problems is *changing political and legal environments*. The experts from the UK and Germany stressed that rapid changes in legislation and negative attitudes of state institutions towards collaboration have a negative impact on the success of science-business collaboration, e.g. public programs for interaction promotion are lacking: "It's obvious that changes in legislation can have a huge influence on some organisations we are working with on joint projects. I think, most likely the ones in the social sciences area because many of our partners are public sector institutions, charity or social organisations. Oftentimes they are influenced by changes in the social and state policy..." (Nathan Burgess).

Interview results support theoretical insights that a lack of resources (human, financial) for interaction management also hinders science-business collaboration. Melanie Schneider, expert from Germany, stressed that "state funding is very poor and until it remains such private funding will only increase". Winfried Holzapfel said: "Insufficiently financed higher education institutions will depend on various funding sources; what really matters isn't where money comes from but science development trends, its image and recognition are the matters of concern for science. I don't think that nowadays, when money is allotted to solve problems in other countries universities could function without financial injections from private sources".

The interviewees stressed the impact of *geographical proximity* on the success of science-business interactions. Nathan Burgess, expert from London South Bank University, said that "...distance management of a project is a complicated matter <...> because of travel expenses and time spent. Actually, management of such projects is a challenge...". Jörg Froth, expert from Germany, said that "...the cluster is set up not in Kassel but in another town, it's advantageous for a small town to collaborate with the university. That makes good conditions...".

The interviewees from the UK said that one more critical barrier to collaboration is a *variety of partners*. This statement was supported by R. Hepworth, CEO for business development from the Insti-

tute of Knowledge Transfer, who said that an obligation to frame clear job descriptions in a partnership is a real challenge for business and science organisations; it is easier for big multinational companies (Expert Interviews, 2009). "...complications arise... we have many partners...it's a difficult task..." (Nathan Burgess).

The results of the discussion with the businessmen from Šiauliai region, summed up by Cibulskiene et al. (2010) in their study, demonstrated potential ways of removing barriers to science-business interaction. In their opinion, it is necessary to build up mutual trust, i.e. to promote formal and informal communication between SRO and BSO. Another critical condition for successful interactions is a stronger focus on the market and the development of marketing skills on the part of science and research organisations, i.e. to raise the awareness of the private sector culture.

Conclusions

Systematization and generalisation of theoretically identified aspects of science-business interaction barriers revealed three groups of barriers: internal, characteristic of SRO, BSO, and common. The following barriers are to be attributed to *science organisations*: insufficient applicability of research outcomes to practice, insufficient dissemination of information on research, the research level, academic ethics, institutional bureaucracy and too complicated procedures. The following barriers are to be attributed to *business organisations*: too big expectations related to research outcomes, negative attitudes towards and preconceptions about research conducted by SRO, limited resources (time, human, financial), non-competence to adopt innovations, unwillingness to manage the strategic planning process, a lack of motivation.

The greatest group of barriers are problems common to both, *science* and *business, organisations*, solutions of which require much time, many efforts and other resources. If the significance of SRO-BSO interaction is acknowledged, it is necessary to seek for the ways of removing these barriers so as to create conditions for this interaction to occur or to make it more effective. The following ways of removing barriers to interaction have been identified in scientific literature: experience in collaboration, a variety of interaction channels, inter-organisational trust, establishing special centres for knowledge transfer.

Comparing theoretically identified aspects of science-business interaction barriers with those put forward by the experts from various countries it can be stated that: the experts confirmed theoretical assumptions that barriers to science-business interaction arise because of differences in the organisational culture in real world settings, i.e. because of a different understanding of the goals and outcomes of collaboration.

The issues of mutual trust and academic ethics identified in theoretical insights are of critical importance. Having generalised the results of the qualitative research the main interaction barriers caused by the specificity of science organisations have been identified in practice: insufficient applicability of research outcomes to practice, problems of academic ethics, opposition of scientists from different science areas and fields and focus on long-term research.

Both science and business organisations agree that interaction between them is necessary, however, it is not of a sufficient quality. One of the ways of solving the problem is building up effective formal and informal ways of communication as that result in a better understanding of a different culture, dissemination of best practice of SRO-BSO interaction and the development of research utilisation.

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Mokslo-verslo sąveikos kliūčių identifikavimas

Santrauka

Šiame straipsnyje apibendrinamos skirtingų autorių įžvalgos apie mokslo ir verslo sąveikos kliūtis. **Straipsnio naujumas ir aktualumas.** Mokslo ir tyrimų organizacijų (toliau – MTO) ir verslo organizacijų (toliau – VSO) bendradarbiavimas apima dvi ir daugiau šalių, kurios nori dirbti kartu siekdamas abipusės naudos. Šie santykiai gali būti trumpalaikiai arba ilgalaikiai bei susidėti iš vienos ar daugiau sąveikos formų ir veiklų (Cibulskienė et al., 2010). Svarbų vaidmenį verslo organizacijų veikloje vaidina moksliniai tyrimai ir jų praktinės taikymo galimybės. Šiuo aspektu bendradarbiavimo tarp MTO ir VSO procesas gali būti suprantamas kaip dėl nuolatinės sąveikos ir grįžtamosios komunikacijos vykstantis abipusis keitimasis žiniomis, išradimais bei rezultatais ir pan. Bendradarbiavimo proceso peržiūrai ir vertinimui atlikti daroma prielaida, kad pagrindinė šio proceso problema yra susijusi su konkrečia sistemine veiklos logika, turinčia savo kalbą ir savitą tikslų sistemą (von Ertel, 1987; Kröcher, 2005, cit. iš: Cibulskienė et al., 2010). MTO ir VSO bendradarbiavimo procesai priklauso nuo įvairių sąlygų (Beier, Edlich, 2007, cit. pas Cibulskienė et al., 2010), kurios gali būti apibūdintos ir kaip pagrindas MTO ir VSO sąveikos kliūtims susiformuoti. Mokslinėje literatūroje nurodoma, kad abiem sąveikos partneriams būdingi kultūros, misijos, politikos, tikslų, struktūros, normų ir vertybių ypatumai. Dėl jų įtakos atsiradę skirtumai sunkina mokslo ir verslo partnerystę. Reikšmingu tampa Lietuvos ir užsienio literatūroje pateikiamų mokslo ir verslo sąveikos kliūčių sisteminimas ir jų įveikimo priemonių išskyrimas. Dėl šių kliūčių mokslo ir verslo organizacijų sąveika yra arba nesėkminga, stabdanti bendradarbiavimo procesą, arba ji apskritai nevyksta.

Tyrimo objektas – mokslo–verslo sąveikos kliūtys ir jų įveikimo būdai.

Tyrimo tikslas – remiantis identifikuotomis teorinėmis mokslo ir verslo sąveikos kliūčių grupėmis ir jų įveikimo būdais, nustatyti praktinėje sąveikoje susiformavusias kliūtis.

Tyrimo uždaviniai:

1. nustatyti teorines mokslo–verslo sąveikos kliūtis ir jų įveikimo būdus;
2. išryškinti pagrindines mokslo ir verslo sąveikos praktines sąveikos kliūtis ir jų įveikimo būdus.

Tyrimo metodai: mokslinės vadybos literatūros analizė ir sisteminimas, taikant klasifikavimo, simplifikavimo ir interpretavimo metodus bei interviu metodą.

Susisteminus ir apibendrinus mokslo–verslo sąveikos kliūčių identifikavimo teorinius aspektus, išryškėjo tokios kliūčių grupės: MTO ir VSO vidinės (individualios) priežastys ir bendros, būdingos abiem pusėms, sąveikos kliūtys. **Mokslo organizacijoms** priskiriamos šios sąveikos kliūtys: mokslinių tyrimų praktinio pritaikomumo stoka, informacijos apie mokslinius tyrimus sklaidos stoka, mokslo lygis, mokslinė etika, instituciniai-biurokratiniai aspektai ir per sudėtingos procedūros. **Verslo organizacijoms** kylančios kliūtys: per dideli lūkesčiai, susiję su mokslinių tyrimų rezultatais, neigiamas požiūris į MTO vykdomus tyrimus ir išankstinės neigiamos nuostatos, riboti ištekliai (laiko, žmogiškieji, finansiniai), negebėjimas apibūdinti veiklos problemų, negebėjimas išsivairinti inovacijų, nenoras organizuoti strateginio planavimo procesą, motyvacijos stoka. Didžiausią sąveikos kliūčių grupę sudaro tiek **mokslo**, tiek **verslo organizacijoms būdingos** problemos, kurioms išspręsti reikia daug pastangų, laiko ir kitų išteklių. Pripažįstant MTO ir VSO sąveikos svarbą, būtina ieškoti šių kliūčių įveikimo būdų, kurie sudarytų prielaidas sukurti šią sąveiką arba ją efektyvinti. Mokslinėje literatūroje išskiriami šie pagrindiniai sąveikos kliūčių įveikimo būdai: bendradarbiavimo patirtis, sąveikos kanalų įvairovė ir tarporganizacinis pasitikėjimas, specializuotų žinių perdavimo centrų steigimas.

Lyginant identifikuotas teorines mokslo ir verslo sąveikos kliūtis su įvairių šalių ekspertų išsakytomis kliūtimis, galima teigti, jog ekspertai patvirtina teorines prielaidas, kad praktikoje mokslo ir verslo sąveikos kliūtys

susiformuoja dėl sąveikos partnerių organizacijų kultūros skirtumų (skirtingų bendradarbiavimo tikslų ir rezultatų suvokimo). Itin svarbūs teorinėse išvalgose išskirti abipusio pasitikėjimo klausimai ir mokslo tyrimų etikos klausimai. Apibendrinus kokybinio tyrimo rezultatus, išryškėjo šios pagrindinės praktinės mokslo organizacijų specifikos lemiamos sąveikos kliūtys: menkas praktinis tyrimų rezultatų pritaikomumas, mokslo etikos problemos, skirtingų mokslo sričių ir krypčių atstovų interesų priešprieša, ilgalaikė tyrimų orientacija. Tiek mokslo, tiek verslo orga-

nizacijos sutaria, kad jų sąveika būtina, tačiau ji nėra pakankamai kokybiška. Vienas sprendimų būdų – efektyvių formalios ir neformalios komunikacijos būdų paieška, lemianti geresnį skirtingų kultūrų pažinimą, gerosios MTO sąveikos su VSO patirties sklaida, mokslinių tyrimų įveiklinimo praktikoje didinimas.

Pagrindiniai žodžiai: mokslo ir verslo sąveika, sąveikos kliūtys, mokslo ir verslo bendradarbiavimas, kliūčių įveikimas, universitetas, įmonė.