AN INTERACTION OF BUSINESS ORGANIZATIONS WITH HIGHER EDUCATION INSTITUTIONS IN BULGARIA IN THE FIELD OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

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Abstract

Over the last decade the interest of the scientific community, business managers and policymakers in the cooperation between higher education institutions (HEIs) and business organizations, and the benefits of the relationship for both parties has increased. This paper presents part of the results of a research project (2018-2020) conducted by the Department of Logistics and Supply Chains at the University of National and World Economy, Sofia, which aims to evaluate the collaboration regarding education, research and innovations between HEIs and business organizations in the field of the logistics and Supply Chain Management (SCM) in Bulgaria. This research expands the available scientific knowledge about such collaboration from the business perspective studying different aspects of the relationship – motives, barriers, forms of interactions, key success factors and outcomes. The analysis of the data, collected by questionnaire survey from 80 organizations in Bulgaria, shows that the leading factors for cooperation with HEIs in the field of logistics and SCM are as follows: effective communication, HEI experience, team commitment and trust. Business organizations are motivated to engage in collaborative activities with HEIs in order to increase competitiveness, rather than receiving financial and material support. In spite of their strong motivation, they are involved in limited forms of interactions with HEIs in the field of logistics and SCM. The lack of time is the main barrier that reduces business-academia

collaboration. Outcomes achieved by the interaction between business organizations and HEIs in Bulgaria are unsatisfactory. Some guidelines for future studies are also outlined.

Key words: business-academia collaboration, logistics and supply chain management, education, research, innovation

1. INTRODUCTION

The interaction between HEIs and business organizations materializes in tangible results that have a beneficial effect expressed for both parties, and the society in general in the face of the national governments and the European Commission. On one hand, the cooperation allows acceleration of the transfer of innovation, which helps to create new products and services, which contribute better competitiveness to be achieved. On the other hand, this beneficial effect also is manifested in improving the knowledge, skills and competencies of the workforce in a particular sector, which creates conditions for increasing labor productivity and GDP per capita.

In the recent years, the topic of enlarging the interaction between HEIs and business organizations has become particularly relevant. The growing interest of the scientific community, business managers and policymakers in the topic is provoked by the awareness of the potential and synergy that collaboration possesses to provide long-term solutions aimed at addressing economic and social challenges facing countries.

In theoretical aspect the topic relevance is determined by the need to achieve a better comprehensive understanding of both stakeholder's perspectives regarding the motives, barriers, forms of interactions, key success factors and outcomes of cooperation in the fields of education, research and innovation. In addition, the need to create a fundamental basis for conducting comparative research is also found out. From a practical perspective, the topic relevance is stemmed from the need to outline the current state of the business-academia cooperation in Bulgaria and in particular in the field of logistics and SCM, so that stakeholders to search for ways to improve their interaction.

Despite the growing number of publications on the topic, the available knowledge is still not enough for in-dept understanding of all aspects and domains of collaboration between business organizations and HEIs. In addition, deficits of knowledge about business-academia interaction exist in the particular professional field of logistics and SCM, both from a business perspective, as well as a HEIs perspective in Bulgaria. Therefore, the aim of this paper is to evaluate the collaboration between business organizations and HEIs regarding education, research and innovations in Bulgaria in the field of the logistics and SCM from a business perspective.

This paper presents the final results of an online questionnaire survey with 80 Bulgarian organizations among which the manufacturing and trading organizations, as well as logistics service providers are prevailed.

The present paper is organized as follows: section 2 presents a review of the literature in the field. The methodology of the research is described in Section 3. The results of different aspects of the relationships between business organizations and HEIs from a business perspective such as motives, barriers, forms of interactions, key success factors and outcomes are discussed in section 4. Concluding remarks and some guidelines for future research are presented in section 5.

2. LITERATURE REVIEW

The literature has identified a broad range of benefits that may be obtained through collaboration with HEIs. The results of a study (Bishop et al., 2011) reveal that organizations gain better understanding of the foundations of particular phenomenon that results from the access to the outputs of scientific research and benefit from knowledge exchanges oriented to provide direct assistance in problem solving. Andersen et al. (2013) found that the businesses interact with universities to capitalise on the university knowledge base for innovation, strategic networking and market related purposes, not short-term financial gains such as gaining access to venture capital or public funds, cutting costs, reducing and sharing risks, increasing revenue, accessing technologies or accessing university physical resources. Thus, the organizations that interact with HEIs can achieve better competitiveness than those which rely only on traditional closed innovation approach (Lam et al., 2012). Based on the literature review on benefits, motives can be divided into two main groups: gaining a competitive advantage through knowledge transferred through education, research or innovations and direct material gains.

Although business organizations can benefit from collaboration with academia, there are some challenges that hinder it. In order to direct efforts toward overcoming barriers, the information about them is essential. Thus, this study also aims to identify factors that impede collaboration between business organizations and HEIs. Barriers can be categorized in two groups, based on the categorization logic of Tartari et al. (2012) orientation- and transaction-related barriers. While the orientation-related barriers (also called "Mertonian" barriers) refer to conflicts about the orientation of both partners, the transaction-related barriers (also called "Williamson" barriers) are associated with costs of dealing with the rules and regulations of the university and conflicts over intellectual property with industry partners. Specifically, the group of orientation-related barriers consists of the following barriers: differences in timescales (e.g. short-term orientation of industry research); difficulty in finding partners with appropriate profile; high personnel turnover and lack of continuity in organizations' research strategies; the nature of scientific research does not conform to the industry interests or needs; mutual lack of understanding about expectations and working priorities; difficult to reach agreements on the timing of the dissemination of research findings. Galán-Muros and Plewa (2019) add to this group as follows: differences in terminology, language, and communication styles. The transaction-related barriers include the following: rules and regulations imposed by university or government funding agencies; policies adopted by the university's technology transfer office; potential conflicts regarding intellectual property rights; absence of established

procedures for collaboration; low profile of university's technology transfer offices. Garcia et al. (2016) add to this group as follows: geographical distance, bureaucracy and costs. The authors grouped "lack of knowledge about universities' activities", "lack of knowledge on the needs of organizations", "lack of professionals to dialogue with academic researchers", "lack of professionals to dialogue with organizations", and "problems on trust" together to construct a new variable called "capabilities barriers". Lack of absorptive capacity also can be added to this group. Moreover, these barriers, from the perspective of this study, of particular interest is also to investigate the following: lack of incentive mechanisms; problems related to making contact; absence of a knowledge/technology transfer units; cognitive distance (Muscio & Vallanti, 2014).

The literature on business-academia collaboration reveals that forms of interactions are relatively wide. Ankrah and Al-Tabbaa (2015) proposed a framework consisted of six main categories, namely: personal informal relationships, personal relationships, third party, formal targeted agreements, formal non-targeted agreements and creation of focused structures. Andersen et al. (2013) classified interactions into five broad types – research-based, service-based, education-based, placement-based and those linked to engagements with university spin-outs or start-ups. Galan-Muros and Davey (2019) studied the development of eight types of cooperation: mobility of academics; governance; curriculum development and delivery; collaboration in research and development (R&D); mobility of students; commercialisation of R&D results; lifelong learning; and entrepreneurship. For the purpose of this research, the forms of interactions are grouped in three groups: education, research and innovation.

The quality of interaction between HEIs and business organizations in the field of logistics and SCM is impacted by different success factors. In general, this interaction is researched in many fields and by different authors (Bruneel et al., 2010; Mora-Valentin et al., 2004; Perkmann et al., 2011). In this paper, common success factors will be presented in a literature review and they will be applied in the field of logistics and SCM in Bulgaria. Similar to the other researched aspects in the interaction between HEIs and business organizations, the factors could be also presented in the three domains of research, education and innovation. Some authors use this approach but others make their research only in one of the three domains. Another difference in the research is that some of them are focused on the different stages of interaction (starting a joint project, ongoing project or a result of an ended project) or only HEI or business organization.

Mora-Valentin et al. (2004) analyze the impact of a series of organizational (commitment, communication, trust, conflict and dependence) and contextual factors (establishment of the relationship, previous links, reputation, and a clear definition of objectives, institutionalization and distance between partners). The findings show, that „the most outstanding factors are, in the case of organizations, commitment, previous links, definition of objectives and conflict, whereas for research organizations previous links, communication, commitment, trust and the partners' reputation are more relevant" (Mora-Valentin et al., 2004, p. 17). In their study, organizations could be accepted as business organizations and the research organizations as a part of HEIs, which gives the possibility to make a comparison. In a study by Bruneel et al. (2010) three factors, researched in HEIs, are outlined:

experience of collaboration, breadth of interaction channels and inter-organizational trust. Pekermann et al. (2011) also consider factors such as funding, researcher's capacity, staff skills and training, motivation and others. Other "network analysis addressing factors that relate to characteristics of: (1) HEIs; (2) regional organizations; (3) the collaborative relationship; and (4) the environmental context in which HEIs and organizations are embedded" (Caniëls and van den Bosch, 2011, p. 271). "As a result of the literature review the following factors are identified and researched: 1) experience of HEI, 2) trust, 3) effective communication, 4) commitment, 5) prior cooperation, 6) time to establish and maintain cooperation, 7) financing, 8) human resources and 9) reputation of HEI" (Mikova et al., 2020, p. 118).

The direct results of the cooperation between the business organizations and HEIs are manifested in several areas of mutual interest for both parties. These domains include: education, research and innovation (Davey et al., 2018; Diaz et al., 2013). The results of the interaction between HEIs and business organizations can be diverse and they can descend from different forms of cooperation. The Science-to-Business Marketing Research Center identifies 8 predominant types of interactions: „collaboration on R&D"; „mobility of academics"; „mobility of students"; „commersialisation of R&D results"; „curriculum development & delivery"; „lifelong learning"; „enterpreneurship" and „governance" (Healy et al., 2014, p. 6) that lead to useful results for both stakeholders. In addition, The University Companies Association in UK presents a system of 9 knowledge transfer mechanisms including the following: "networks"; "continuing professional development"; "consultancy"; "collaborative research"; "contract research"; "licensing"; "spin-outs", "teaching" and "other measures" (Holi et al., 2008, p.1) that generate useful results for both HEIs and business organizations. Various quantitative and qualitative indicators, which measure both the outcomes of interactions and the mechanisms for knowledge transfer, have been developed (Holi et al., 2008; Jensen, 2009; Seppo & Lilles, 2012). However, the existing evaluation tools are universal. They are designed for all professional fields and do not allow access to the direct results of cooperation in the field of logistics and SCM both in Bulgaria (Meerman et al., 2018) and the rest of the countries. As a consequence, the existing knowledge of cooperation outcomes in this professional field is insufficient. This determines the need of a more detailed study of the results of the interaction of business organizations and HEIs in the field of logistics and SCM in Bulgaria in order to fill the existing shortage in science.

3. METHODOLOGY

Five research questions are investigated in this article. First, what motivates business organizations to interact with HEIs? Second, how do they perceive barriers to collaboration? Third, which collaboration practices are the most frequently used? Fourth, which are the factors influencing the decision of business organizations to build relationships of collaboration with HEIs? Fifth, which are the business organisations outcomes achieved as a result of collaboration with HEIs?

Methodological tools to assess the motives, barriers, forms of interactions, factors and results of business-academia collaboration are developed in this research. They are presented in details below.

The first group of indicators, *motivations*, aims to identify the underlying rationales for organizations to collaborate with HEIs. Motivations are assessed through the usage of a scale of 26 items covering a broad spectrum of benefits that can be obtained from the collaboration with HEIs. The motivation items are based on research by several authors (Andersen et al., 2013; Bishop et al., 2011; Lam et al., 2012; Ankrah & Al-Tabbaa, 2015; Radas, 2004; Dutrénit & Arza, 2015) and are measured on a scale ranging from 1 to 5, where the higher the value, the stronger the motive (i.e. the respective item is more likely to be a motive). The assessment of motivations will provide insight into the organizations' orientation to cooperate with academia. Thus, based on the identification of main motivations, recommendations can be made regarding policies and incentives for the facilitation of cooperation.

To capture the *barriers*, business has faced when engaging with academia, respondents are asked to rate the extent to which a set of 38 items acted as a constraint to business involvement in interactions with academia on a five-point Likert scale from "does not impede at all" to "strongly impedes". Barriers that are included in the survey questionnaire are based on research by several authors (Galán-Muros & Plewa, 2019; Tartari et al., 2012; Garcia et al., 2016; Muscio & Vallanti, 2014).

Forms of interactions are assessed through the usage of a scale of 39 items representing various collaboration practices in education, research, and innovation. The selected practices are based on several research (Andersen et al., 2013; Galan-Muros & Davey, 2019; Ankrah & Al-Tabbaa, 2015). The aim is to assess frequency of interaction with HEIs via each of the surveyed practices. Respondents are asked to indicate the frequency of use of each channel on a five-point rating scale, where: 1 – never; 2 – very rarely; 3 – rarely; 4 – often; 5 – very often. Based on this indicator, we could determine what are the typical channels of interaction, the degree of formalization of joint activities (formal or informal interaction), and the intensity of interaction with respect to domain of activity (education, research and innovation).

In this paper, 9 *factors* are studied in the three domains: education, research and innovation. The results were registered on a Likert scale where the meanings are as follows: 1 - the factor does not have influence, 5 - the factor has a high influence on the interaction between HEIs and business organizations. In present analysis, the overall weighted average grades are used and only the significant differences in individual average grades between the types of business organizations are discussed.

The direct *results* achieved for the business organizations from their cooperation with HEIs are studied with the help of a set of 15 indicators which are divided into three groups. The first group covers the learning outcomes and includes 6 indicators. The second group characterizes the research outputs and consists of 5 indicators. The third group presents innovation based on the outputs and covers 4 indicators.

The data, collected by the respondents, were recorded on the ordinal scale. The answers to each indicator were registered on a 5-point Liekert scale, in which the meanings are as follows: 1 – not achieved; 2 – low achieved; 3 – moderately achieved; 4 – high achieved and 5 – very highly achieved.

In all groups related to results, the average grades for each of the indicators are presented. Moreover, an overall indicator of the summarized average grades is used for the respective field - education, research and innovation, and the value is calculated as a weighted average grade. In addition, the analysis interprets the importance of individual differences by groups of business organizations and indicates the share of their responses to the respective indicator. This is done in cases where the individual average grades are above 3.50 inclusive.

The paper is based on data from an online questionnaire survey conducted in the period May-December 2020 among 80 Bulgarian organizations. The manufacturing and trading organizations, as well as logistics service providers are prevailed in the sample. The share of manufacturing organizations in the sample is 25 %, trading organizations occupied a share of 28.8 % (from which 12.5 % are wholeselers and 16.3 % are retailers), logistics service providers account for a share of 41.2 %, manufacturers/ importers of logistics software occupied a share of 1.3 % and the rest organizations with a share of 3.7 % are classified as others. According to the criterion number of employees, large organizations with more than 250 employees occupied a share of 36.25%, medium organizations with 50 to 249 employees account for a share of 26.25% and small organizations with up to 49 employees inclusive occupied a share of 37.5%.

For the data processing the methods of descriptive statistics, as well as SPSS and Excel softwares were used.

4. RESULTS AND DISCUSSION

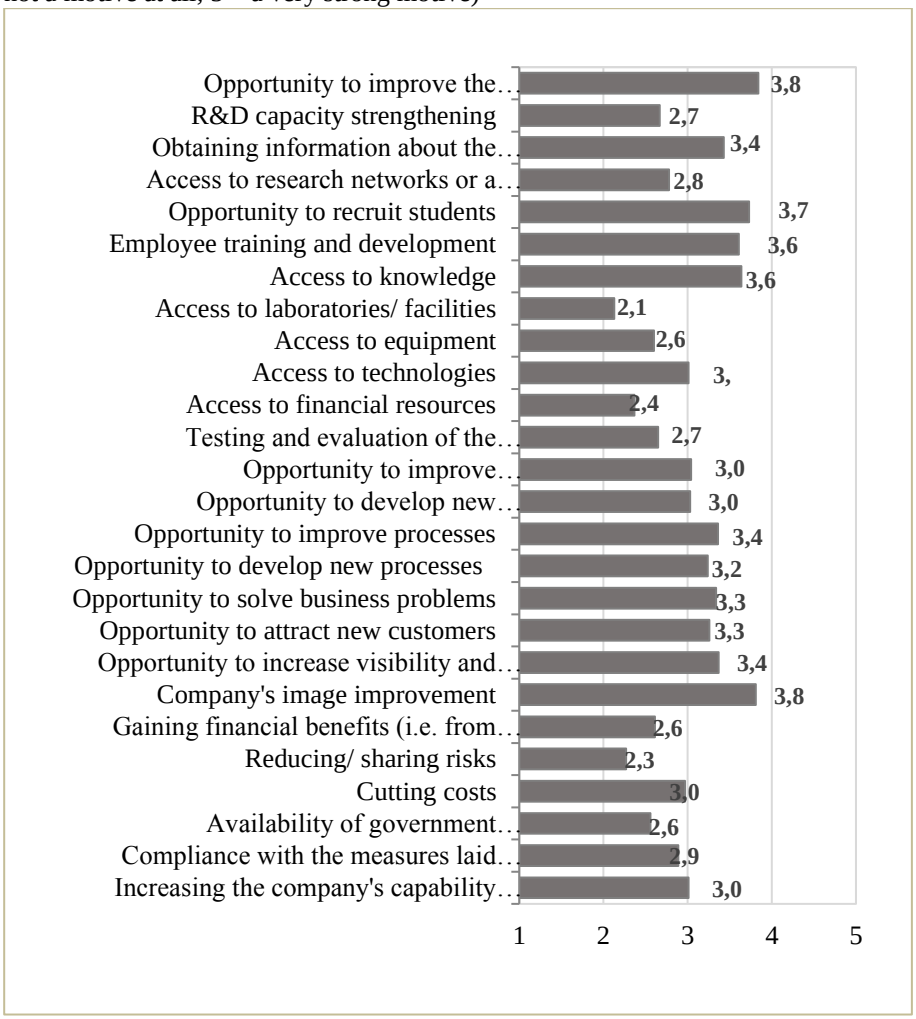
4.1 Evaluation of the motives to collaborate with HEIs in the field of education, research and innovation

The results indicate that business organizations are mostly motivated to collaborate with academia by the desire to enhance their reputation and to increase competitiveness through knowledge transfer and workforce development, rather than for receiving financial and material support (Figure 1). The results show that there are five main motives for interaction with HEIs: “opportunity to improve the competitiveness”, “organization’s image improvement”, “opportunity to recruit students”, “access to knowledge” and “employee training and development” (all mean scores are around 4). Access to laboratories/ facilities, reducing/ sharing risks, and access to financial resources are the weakest motivators. It is observed that R&D capacity strengthening, access to research networks or a prerequisite to collaborate with academics, opportunity to improve/develop new products/services/processes and opportunity to solve business problems receive low scores among the tested motives. Thus, given these findings, it can be suggested that business organizations have readiness to cooperate with HEIs in education, but not so much in research and innovation.

While all these primary motivational drivers for business-academia relations are relevant for all business organizations regardless the sector in which they operate, the importance of the other variables differed by sectors. For instance, while the

manufacturing organizations perceive the opportunity to develop new processes and to improve processes as strong motivators for interaction, the trading organizations and logistics service providers are motivated by the willingness to obtain information about the trends related to the sector and the environment in which the organization operates and to increase visibility popularity of the organization's products/ services, and by the opportunity to attract new customers.

Figure 1. Organizations' motivations for collaboration with HEIs (mean scores, 1 – not a motive at all; 5 – a very strong motive)



Source: Author's calculations

4.2 Evaluation of the barriers to collaborate with HEIs in the field of education, research and innovation

The analysis of barriers shows that lack of time is the main factor that impedes business-academia collaboration in the field of logistics and SCM, having an impact only on one of the domains – research (mean score above 3.5). All other items cannot be determined as relevant due to the low mean scores (below the 3.5 cut off point). The mean scores are shown in Table 1. In spite of overall low rating of items it should be noted that 1/3 of the respondents indicate that lack of awareness of opportunities arising from collaboration with HEIs and of opportunities which knowledge/technology transfer units offer, lack of incentive mechanisms, and HEIs unfamiliarity with industry's actual needs are significant barriers. Furthermore, in terms of domains in which collaboration can takes place, more barriers are perceived by respondents in research and less in education. Moreover, the above mentioned barriers, factors that hinder establishing links with HEIs in research are lack of experience in collaboration with HEIs and the nature of scientific research does not conform to the industry interests or needs.

The mean scores for collaborating and non-collaborating organizations are compared in order to determine whether there are any differences in perception of barriers. The results show that organizations that have never collaborated with academia perceive more barriers compared to collaborating organizations. Thus, this fact confirms the results of another study which reveal that prior collaboration experience mitigate the barriers to university-industry collaboration (Bruneel et al., 2010).

The analysis by sectors indicates that there are differences in perceptions of barriers. Trading organizations perceive the most barriers, while the least barriers are perceived by manufacturing organizations and logistics service providers. While misalignment of research and education with industry needs are ranked top by manufacturing organizations, for trading organizations lack of time, bureaucratic procedures within HEIs, lack of incentive mechanisms, absence of established procedures for collaboration with HEIs, lack of experience in collaboration with HEIs, absence of a knowledge/technology transfer units, lack of awareness of opportunities which knowledge/technology transfer units offer and lack of professionals to dialogue with academic researchers/business are the top barriers. The main barrier hindering cooperation for logistics service providers is the lack of time. These results indicate that while trading organizations and logistics service providers perceive higher transaction-related barriers, for manufacturing organizations the barriers are related to differences in the orientation of industry and HEIs. The present findings can help to better formulate the recommendations for their mitigation.

Table 1. Barriers for collaboration with HEIs (mean scores, 1 – not a barrier; 5 – a very strong barrier; EDU – education; RES – research; INN - innovation)

Barriers	EDU	RES	INN
Problems related to making contact with academics/HEIs	2,27	2,42	2,44
Difficulty in finding HEIs with appropriate profile	2,37	2,37	2,34

Barriers	EDU	RES	INN
Geographical distance	2,16	2,22	2,13
HEIs are not interested to collaborate with business	2,55	2,43	2,34
The organization is not interested to collaborate with HEIs	2,57	2,61	2,63
The organization lack of awareness of opportunities arising from collaboration with HEIs	2,83	2,93	2,78
Universities lack of awareness of opportunities arising from collaboration with business	2,53	2,64	2,41
Lack of financial incentives	2,71	2,69	2,66
Lack of financial resources of the business	2,32	2,60	2,52
Lack of financial resources of the HEI	2,19	2,46	2,41
Lack of time	3,05	3,51	3,23
Bureaucratic procedures within HEIs	2,70	2,71	2,65
Bureaucratic procedures within the organization	2,61	2,55	2,51
Lack of incentive mechanisms	3,05	2,85	2,75
Rules and regulations imposed by HEIs/ government	2,44	2,45	2,41
Policies adopted by the HEIs for knowledge and technology transfer	2,31	2,36	2,35
Absence of established procedures for collaboration with HEIs	2,60	2,79	2,61
Lack of experience in collaboration with HEIs	2,67	2,94	2,59
Absence of a knowledge/technology transfer units	2,71	2,76	2,70
Lack of awareness of opportunities which knowledge/technology transfer units offer	2,81	2,88	2,95
Differing time horizons between university and business	2,49	2,45	2,51
Short-term orientation of industry research	2,11	2,12	2,05
Long-term orientation of university research	2,30	2,29	2,21
The nature of scientific research does not conform to the industry interests or needs	2,56	2,80	2,44
HEIs' research is fundamental oriented	2,54	2,62	2,48
Business' research is applications-oriented	2,20	2,28	2,15
Mutual lack of understanding about expectations and working priorities;	2,42	2,47	2,35
HEIs are not familiar with industry's actual needs	2,84	2,89	2,73
Diversity in research methodologies and in the use and interpretation of knowledge	2,49	2,60	2,51
Limited ability of business to absorb knowledge transferred	2,37	2,39	2,57
Differences in terminology, language and communication styles and channels	2,41	2,40	2,46
Lack of professionals to dialogue with academic researchers/business	2,38	2,54	2,60

Barriers	EDU	RES	INN
High personnel turnover and lack of continuity in organizations' research strategies;	2,14	2,18	2,22
Confidentiality of information	2,74	2,66	2,73
Potential conflicts regarding intellectual property rights	2,15	2,08	2,33
Lack of trust	2,07	1,99	2,20
Joint activities do not contribute directly to the organization's competiveness	2,44	2,29	2,44
Results from university research are not applicable	2,32	2,15	2,29

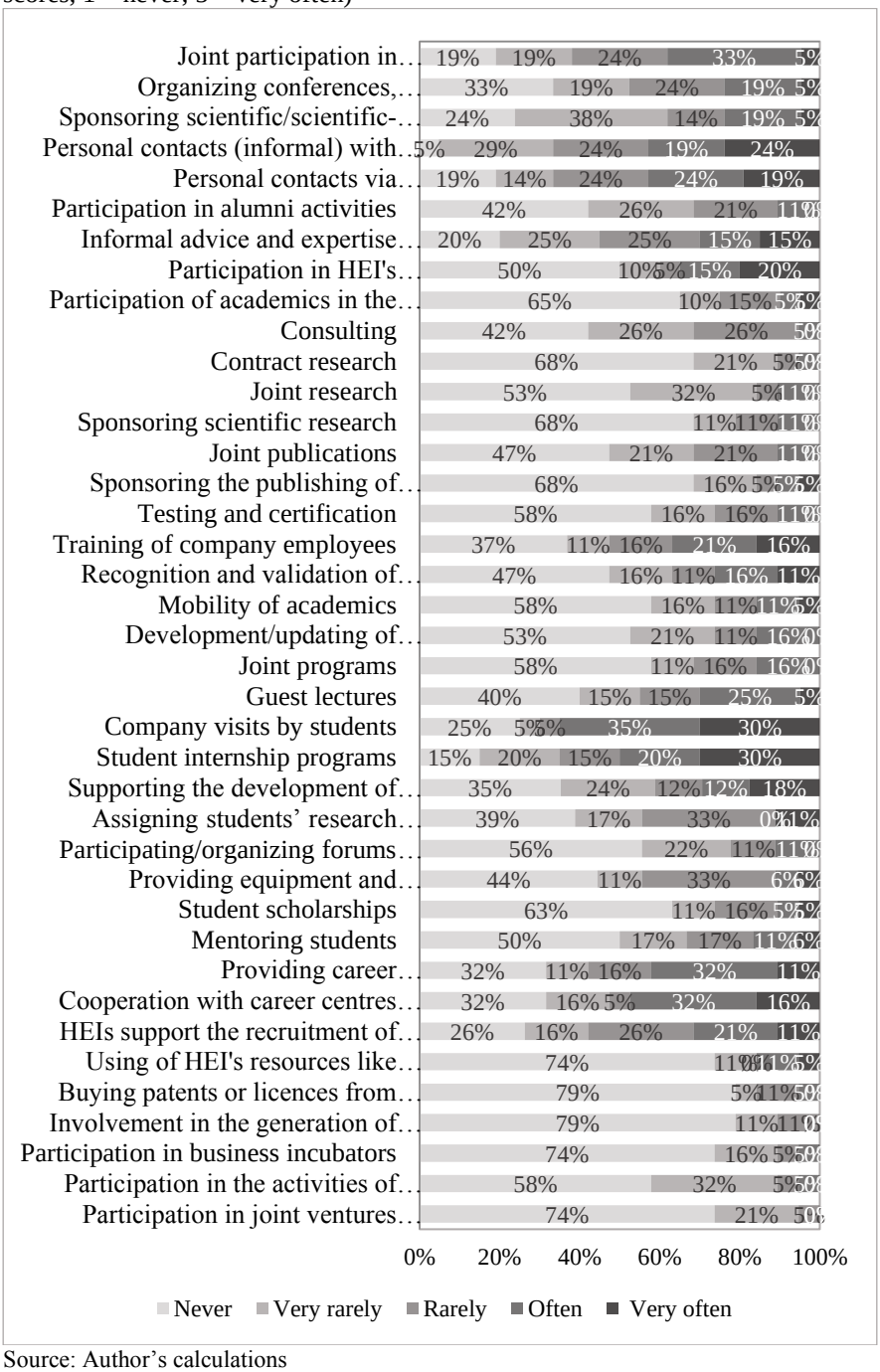
Source: Author's calculations

4.3 Evaluation of the forms of interactions with HEIs in the field of education, research and innovation

The analysis of forms of interactions between business organizations and HEIs in the field of logistics and SCM is based on the responses of the organizations that have collaboration experience with HEIs. The organizations that have never collaborated with HEIs are excluded from the analysis. Figure 2 reports the frequency of use of particular collaboration practices, as well as the share of „frequently used practices" (i.e. „often" or „very often"), and share of „rarely used practices" (i.e. practices received scores below 3). The survey results show that business organizations are involved in limited forms of interactions with HEIs in the field of logistics and SCM. Organization visits by students (65%) and student internship programs (50%) are the most frequently used channels of interaction with HEIs. Cooperation with career centres of HEIs, providing career information/organizing career days, informal contacts with academics, contacts via membership of professional organizations, joint participation in conferences, roundtables, and workshops and training of organization employees follow in frequency. Consulting, contract research, buying patents or licences from HEIs, involvement in the generation of spin-offs/start-ups, and participation in business incubators and joint ventures with HEIs receive the lowest ratings overall. These results to some extent correspond to the findings for motives and barriers. As it was seen, the organizations consider that HEIs could contribute to their competitiveness through education, not through collaborative research and innovations. Moreover, more barriers are perceived by respondents in research and less in education.

The comparative analysis between the different types of organizations shows that the intensity of links varies in some degree. While, logistics service providers provide student internship opportunities, trading organizations collaborate more intensively with HEIs via contacts with academics and organization visits by students. Manufacturing organizations reported that very often they organise on-site visits. Based on these results, it can be concluded that business organizations are heavily engaged with HEIs in activities related to education and less related to research and innovation.

Figure 2. Frequency of interaction between HEIs and business organizations (mean scores, 1 – never; 5 – very often)

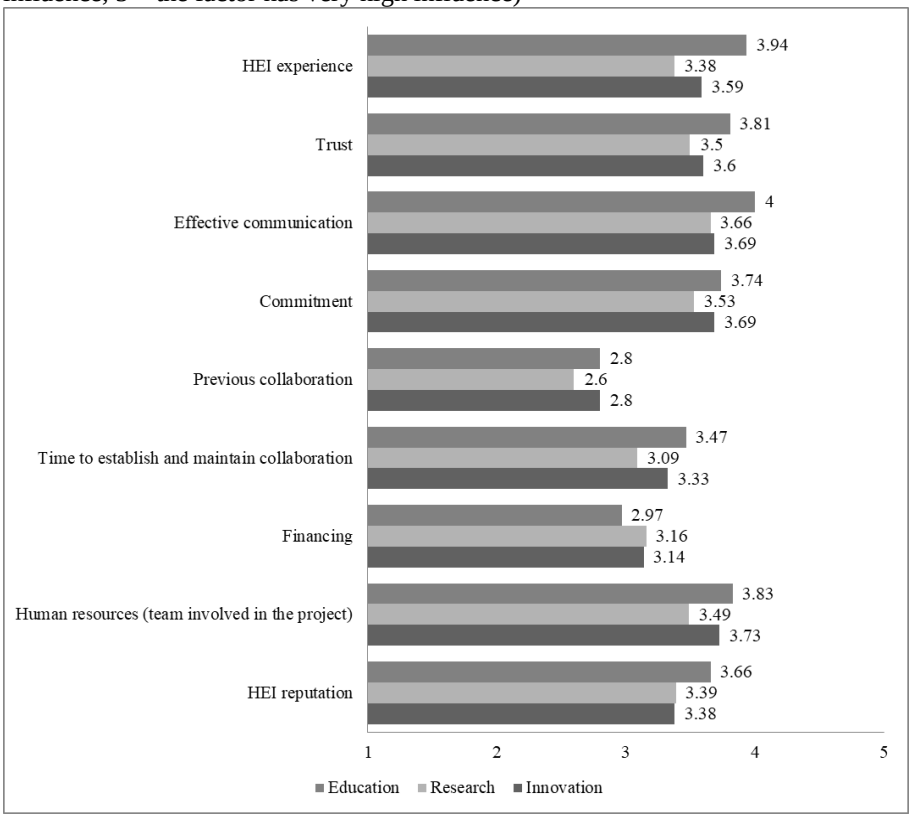


Source: Author's calculations

4.4 Evaluation of the factors to collaborate with HEIs in the field of education, research and innovation

The study results of the factors influencing the decision to build a relationship of collaboration with HEIs in the three domains: research, education and innovation in the field of logistics and SCM are presented in figure 3.

Figure 3. Factors influencing the decision of business organizations to build relationships of collaboration with HEIs in the three domains: research, education and innovation in the field of logistics and SCM (1 – the factor has very low influence, 5 – the factor has very high influence)



Source: Author's calculations

On a positive note, the mean score is around and above 3 for almost all indicators in the three domains with the exception of the "previous cooperation" factor for which the mean scores are between 2.6 and 2.8. This shows that the rest of the factors have an impact on building the relationship from a medium to high degree and the presence of previous cooperation with HEIs is not crucial for business organizations to seek interaction with them.

The figure 3 shows that in the domain of "education" business organizations have given the highest mean scores for the studied indicators and the lowest - in the domain of "research". The difference in mean scores for each individual factor in the three domains is not significant - from one tenth to half a unit (for the HEIs experience factor). The conclusion, that can be drawn from the analysis of these data, is that business organizations take actions to establish cooperation with HEIs in each domain, influenced almost equally by these factors.

The factors that could be distinguished in the field of *education*, are as follows: effective communication, experience of HEIs, team commitment, trust, human resources and reputation of HEIs (with the highest scores around 4). Other factors, such as funding and previous cooperation, have less influence on the decision to build a relationship of collaboration (with neutral values around 3).

Leading factors for business organizations in the field of *innovation* are the same factors as in the education, but with lower average grades about 3.5. This trend is maintained by comparing the influence of the leading factors in the domain of research and the domain of innovation. With the exception of the HEIs experience factor, there are slight differences in the average grades of the indicators: trust, effective communication, commitment and human resources (with scores from 3.49 to 3.73). The reputation of HEIs in the domain of research and education is already lower and declining in importance. There is a degree of importance of the HEIs experience, which in the domain of training tends to be high (3.94), and in the domain of research it is below 3.5. The innovation domain is approaching a high degree of importance (with a value of 3.59). This shows that from the point of view of business organizations, the HEIs experience in student education and innovation is crucial for establishing collaboration while the HEIs experience in research does not have such a strong influence on launching joint projects in this domain.

It is interesting to consider the low mean scores (around 3), which are given in all three domains for the financing factor. In many studies, especially in the field of engineering and technical sciences, financing is a very important factor, but the results of this study show that among business organizations in the field of logistics and SCM in Bulgaria this factor has less influence on the decision to build cooperative relations with HEIs. The previous cooperation is the factor with the lowest importance in all three domains with scores from 2.6 to 2.8. This shows that for business organizations, previous forms of relationship would not influence future ones.

The analysis of the individual average grades shows, that retailers results, are the lowest among all type of organizations with only few mean scores above 3.5 (HEI experience in domain of education – 3.89, commitment in domain of innovation – 3.5, human resources in domain of education – 3.55 and in domain of innovation – 3.5) and some significant deviations under the weighted average in the three domains for the factors trust and effective communication with one unit under the average results for all organizations. The results of wholesalers are above 3.5 in all domains with the exception of three factors: previous collaboration (from 2.11 to 2.5), time to establish and maintain collaboration (from 3 to 3.38) and financing/funding (from 3 to 3.25) which shows a higher influence of the rest of the factors that can be considered as important. Manufacturing organizations and logistics service providers, which represent 65% of all respondents, have the highest average grades. Even though, the

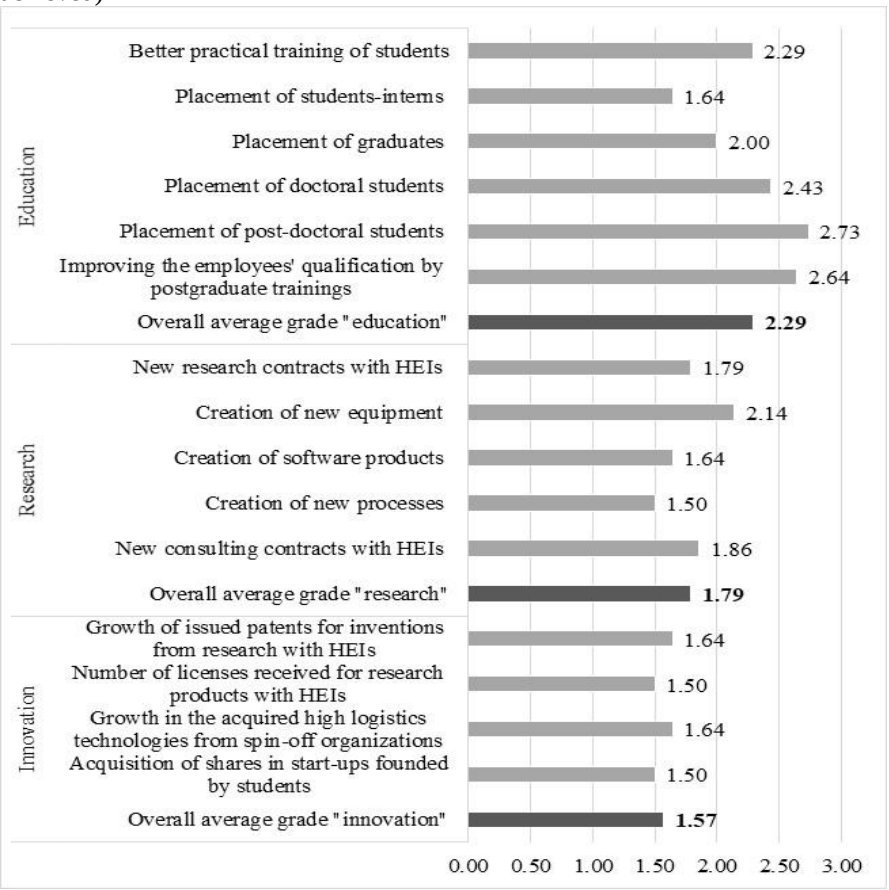
factor "previous collaboration" has a low influence for the logistics service providers (from 2.35 to 2.58) and significant influence for the manufacturing organizations (from 3.35 to 3.71).

4.5 Evaluation of the results of the interaction with HEIs in the fields of education, research and innovation

The effects of the interaction between business organizations and HEIs in the field of logistics and SCM were studied based on the self-assessments of the respondent organizations in a total of fifteen specific results in the three domains - education, research and innovation, achieved in the last three years (2018 – 2020).

The average grades of the results in the field of education, research and innovation in logistics and SCM are presented in figure 4.

Figure 4. Outcomes achieved from the interaction with HEIs in the field of logistics and SCM during the last 3 years (average grades, 1 – not achieved; 5 – very highly achieved)



Source: Author's calculations

The analysis of the data from figure 4 shows that from 2018 to 2020 the business organizations surveyed assess the overall results of their interaction with HEIs in the field of "education" in logistics and SCM as unsatisfactory (the overall average grade is 2.29), which indicates unused potential of cooperation between both stakeholders.

Business organizations achieve relatively satisfactory results in terms of improving the practical training of students and hiring interns and graduates in the field of logistics and SCM (average grades for these indicators are around and above 2.5). This means that the business still does not fully cooperate with HEIs with respect to better practical training of its future workforce and its early inclusion in working life in the professional field studied. The analysis of the individual average grades shows that better practical training of the students is observed in a relatively high degree (average grade 3.50) in the logistics service providers (18.9% of answers). Practices related to the appointment of graduates are applied to a high degree (average grade 4.00) by wholesalers (11.8% of answers).

Business organizations achieve low results related to the employment of doctoral students, post-doctoral students, as well as improving the skills of employees by postgraduate training in the field of logistics and SCM from 2018 to 2020. The average grades for these indicators are around 2. This shows that logistics managers use to a lesser extent the potential of interaction with HEIs both providing highly qualified specialists and maintaining the qualifications of employees in the field of logistics and SCM. The analysis of the individual average grades shows that in a relatively high degree (average grade 3.50), doctoral students are appointed by logistics service providers (25% of answers) and in a very high degree (average grade 5.00) doctoral students are hired in the manufacturers/ importers of logistics software (17.9% of answers). As a result of their interaction with HEIs, logistics service providers (30.4% of answers) have hired post-doctoral students to a relatively high degree (average grade 3.50). Most significant results in the improvement of employees' qualification show logistics service providers (21.9% of answers), which demonstrate a relatively high degree (average grade 3.50) of cooperation with HEIs in the field of logistics and SCM education.

In regard to research, business organizations and HEIs interact unsatisfactorily (the overall average grade is 1.79). On one hand, the low average grades for new research contracts (average grade 1.86) as well as for consulting contracts (average grade 1.79) with HEIs in the field of logistics and SCM means that business organizations have limited opportunities to: use the results of research in management decisions, effectively solve their specific problems and improve their competitiveness and logistical results with the help of science-based methods. On the other hand, the scientific community to a limited extent focuses its research to specific business priorities. It distances both stakeholders and prevents them from realizing the full potential of their joint cooperation in logistics and SCM research. The analysis of the individual average grades shows that to a high extent (average grade 4) new research contracts by the wholesalers (15.4% of answers) and logistics service providers (30.8% of answers) are concluded. New consulting contracts with the wholesalers (16% of answers) are concluded to a high extend (average grade 4).

Low results of the cooperation between business organizations and HEIs in terms of the new logistics equipment created, software for management of logistics

activities in separate logistics systems and in the supply chain, as well as new logistics processes are registered. This limits the ability of business organizations to improve the efficiency and effectiveness of the management of individual logistics activities, achieve faster and more successful integration with other partners along the supply chain, accelerate the digitalization of logistics processes and adapt more quickly to new requirements in delivery patterns, imposed by the changes in consumer behavior. Software products are created to a relatively high degree (mean score 3.50) and to a comparatively very high degree (mean score 4.50) new processes for logistics service providers are created (around 30 % share of answers to both questions) from 2018 to 2020.

The results, achieved by the cooperation of business organizations with HEIs in the field of "innovation" are unsatisfactory (the overall average grade is 1.57).

The growth in the received patents of inventions and licenses of products from joint research with HEIs in the field of logistics and SCM during the study period is low. This result can be explained to some extent by the fact that business organizations rely mainly on standard industry solutions for the management of logistics activities, rather than on the search for solutions specific to their needs. The analysis of the individual average ratings shows that there is an exception for logistics service providers (39.1% of answers), which achieve growth in the received licenses for research products in almost the highest possible degree (average grade 4.50).

Low growth in acquisition of high technologies in the field of logistics and SCM by spin-off organizations is also achieved. This result can be explained both by the poorly functioning research & development system and by the lack of a sufficient number of centers in HEIs that support the transfer of the created innovative logistics technologies to the participants in the branch.

Shares of start-up organizations in the field of logistics and SCM, founded by students, are acquired at low degree by business organizations. This shows that logistics managers are more conservative about the opportunities for acquiring start-up businesses, which leads to an increase in the total number of participants in the industry and increases competitive pressure. The analysis of the individual average grades shows that the wholesalers (17.4% of the answers) register a high degree (average grade 4) in the acquisition of shares from start-up organizations, founded by students.

5. CONCLUSION

The results revealed that business organizations view HEIs as a source of valuable knowledge, expertise and talents that can contribute to their competitiveness. Another main motivator for closer links with HEIs is the desire to enhance reputation. Financial gains and material support were found that do not affect the organization's decision to cooperate with HEIs. The majority of business organizations use limited channels of interactions or do not interact with HEIs at all. Most of the relationships in the field of logistics and SCM are related to education activities and less related to research and innovation. One possible reason for the reported infrequent and non-intensive interactions is the lack of time, as it was reported as a main obstacle for

interaction with HEIs. The deeper analysis of barriers by sectors revealed that some organizations perceive higher transaction-related barriers, for other the barriers are related to differences in the orientation of industry and HEIs. Thus, these results suggest that HEIs need to rethink their structures, strategies and policies and to take a more open and flexible approach in interactions with business. Another explanation of this result could be that business organizations have not realized yet the benefits of such an engagement in collaboration agreements with HEIs. This requires taking initiatives to improve awareness.

The following main conclusions about factors can be drawn: 1) In the domain of education, most of the factors have a biggest influence on the decision of business organizations to build relationships of collaboration with HEIs in the field of logistics and SCM with highest average results; 2) The factors with the biggest impact in the three domains are as follows: effective communication, HEI experience, trust and human resources while these with the least influence are previous collaboration and financing; 3) The wholesalers, manufacturing organizations and logistics service providers have higher scores which are around the average for each factor compared to retail and other organizations which have lower results because of lower influence of the factors researched.

Based on the results presented, it can be concluded that, in general, business organizations interact to a limited extent and realize insufficiently the potential benefits of closer cooperation with HEIs in the field of education, research and innovation to increase competitiveness, achieve better results from the management of logistics activities and customer service. In addition, some exceptions from the general conclusion by groups of organizations and outcomes achieved are observed. The analysis of individual grades shows that logistics service providers' results in the field of practical training of students, the placement of doctoral and post-doctoral students, and professional development of employees through postgraduate trainings in logistics and SCM are improving at relatively high extent. In regard to hiring of doctoral students from manufacturers/ importers of logistics software very high results are achieved. New research contracts and new consultancy contracts with HEIs are concluded at high extent by wholesalers. Significant positive outcomes stand out in the logistics service providers, which are realized in terms of concluding new contracts for research, in the creation of new software products and new processes. Exceptions are also observed both the logistics service providers registering a very high growth in the received licenses for research products and the wholesalers reporting a high growth in the acquisition of shares from start-ups.

To sum up, the present study contributes to the enlargement of existing knowledge to business-academia collaboration in logistics and SCM in several ways. First, it presents the current state of cooperation between HEIs and business organizations in Bulgaria in the field logistics and SCM from a business perspective. The study results can support Bulgarian government authorities in conducting policy in the field and allow stakeholders to identify areas for improving cooperation between business and academia. Second, the study contributes to a more comprehensive understanding of a business organizations perspective regarding the motives, barriers, forms of interactions, factors and results of cooperation between HEIs and business in the field of logistics and SCM in education, research and

innovation. Third, the study provides a foundation for conducting comparative analyses, both nationally in different time periods and internationally for comparisons between different countries.

The presented results of the research provide an answer to the formulated research questions. Based on the conclusions achieved, several recommendations for improving the cooperation between business organizations and HEIs can be drawn up, as follows:

First, based on the finding of insufficient business awareness of the benefits it can extract from its cooperation with HEIs, it would follow that HEIs should undertake actions to broaden the dissemination of results produced by their scientific research and to clarify the potential applications in the work of business organizations.

Second, HEIs could initiate more frequent occasions for dialogue for a such as round tables, conferences and symposia; open up spin-offs organizations of knowledge and technology transfer as well as develop procedures for cooperation with business organisations. These actions could lead to improving communication and increasing trust between the two parties. The lack of time, specified by business as one of the main barriers for developing collaboration with HEIs, could be overcome if both sides created specialist units and positions for dedicated employees within their organisational structures, which could facilitate this process and related activities, while saving managers' and academic researchers' time.

Third, key factor for the successful development of collaborative projects for business organisations is the practical orientation of research projects, which will require HEIs to develop a stronger focus on research studies of applied character offering real benefits for business.

Fourth, active government support is required to address the lack of mechanisms which stimulate the development of a collaborative business-academia relationship. Such support could be expressed by reducing bureaucratic requirements for issuing patents and licences, providing financial rewards for innovations, and offering opportunities for grants and low interest rate loans.

Some limitations have to be taken into account. Firstly, due to the broad nature of the topic, the study focuses only on examining the perceptions of business organisations with respect to their motivations to collaborate with HEIs, existing barriers, forms of interactions, key success factors and outcomes achieved from business organizations interaction with HEIs. The support mechanisms, the role of the government, the national context in which both business and academia operate are excluded from the subject of the study. Second, the study focused solely on the perceptions of business organisations, thereby excluding the perceptions held by HEIs. Taking into account both perspectives would allow comparative analyses and would be helpful for policy making and for the definition of proper managerial actions to undertake. Third, the size of the sample limits the generalization of the findings of the study. Studies with a larger sample size are needed to confirm these findings.

Future research in the field can be focus on studying the HEIs perspective on various aspects of relationships - motives, barriers, forms of interactions, factors and outcomes, which are achieved in the three domains - education, research and innovation. In addition, comparative analyses that can be carrying out from both

stakeholders' perspectives in particular aspect and domain of interaction, nationally and internationally are also needed.

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