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TELL ME YOUR COMPANIONSHIP, AND I WILL TELL YOU WHO YOU ARE. ESTABLISHING AND MAINTAINING NETWORKING INTERACTIONS OF UNIVERSITY-INDUSTRY COLLABORATION IN THE DANUBE REGION

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Abstract: University-Industry collaboration has drawn much attention in recent years when it comes to organizational studies. To enhance their competitiveness and innovativeness, Small and Medium Enterprises (SMEs) must be ready to interact with a broad range of external actors - as in our case, academic High-Performance Computers (HPC) centres. The present discussion will draw attention to processes of creation of networking interactions. The research was conducted in 14 countries of the Danube Region, and it reveals conditions for creating and maintaining networking interactions between academic HPC providers and SMEs working in the automotive or electronic sectors. The main research questions the article addresses are a) how the networking interactions are initiated and structured in the Danube region, and b) what are the characteristi of networking interactions between automotive and electronic sector SMEs and academic HPC providers of the region.

Keywords: University-industry cooperation, network interactions, social capital, academic HPC centres, SMEs, Danube Region.
JEL codes: Z13, O14, O3, L29

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1 Introduction

It was Miguel the Cervantes Saavedra who put the famous words: "Dime con quién andas, y te diré quién eres4" into the mouth of Sancho Pansa in his renowned novel of Don Quixote. We are nowadays intending to apply the meaning of those words to the complex dynamics of modern societies. At the first glance it is unimaginable what do have in common the topics of University-Industry collaboration and Don Quixote. If we start off at the position that networking interactions (ei. your companionship) do have great influence on the processes of ensuring innovation and competitiveness. University-Industry collaboration is a topic drawing much attention when it comes to organizational studies (Buehling & Geissler, 2022a) and the effects of such collaborations are perceived as increase in knowledge and prosperity (Buehling & Geissler, 2022b) is oftentimes understood as one of the sides of Open innovation (De Bernardi, Forliano, & Bertello, 2020). The Open Innovation is considered as one of the global trends, along with the proliferation of the ICT (Singh, Bartikowski, Dwivedi, & Williams, 2009). It was the proliferation of the ICT that has brought the need of organizations to utilise the ICT tools to ease, speedup and costumer-adjust the services (Hönigsberg & Dinter, 2019). Additionally, the SMEs utilize the benefits of ICT and new technologies also to increase competitiveness, remain involved in the processes of innovation, developing new products and efficiently respond to market demands (Tarutė & Gatautis, 2014) but also to keep communication, collaboration or event improve their position withing the value chain (Camarinha-Matos, Fornasiero, Ramezani, & Ferrada, 2019).

In order to efficiently do this, the companies have to, not always but in many cases, adjust their business models to be more in line with the Open innovation paradigm (Albats, Podmetina, & Vanhaverbeke, 2021; Cuesta, Ruesta, Tuesta, & Urbiola, 2015; De Bernardi et al., 2020) contributing to strengthening own horizontal integration (Camarinha-Matos et al., 2019). The present study aims at exploring the establishment of networking interactions, in the Danube Region countries, when it comes to the question of University-Industry collaboration. As the contribution of the universities to economic development (Quatraro & Scandura, 2020) is positive and well documented, some focus will be steered to Industry, particularly

[4] Tell me your companionship and I will tell you who you are

SMEs of the Danube Region. The SMEs taken in consideration for the present research, are working in automotive industry as suppliers to Original Equipment Manufacturers (OEM). Such established organizational networking interactions are important factors contributing to development of SMEs in terms of innovation, competitiveness and even initiate the transition towards what is known as Industry 4.0 (Camarinha-Matos et al., 2019; Crupi et al., 2020). Based on this, the SMEs must continue to innovate (see also Pandiloska Jurak, 2020) and, in present case, be able to benefit from the usage of the HPC services (Suklan, 2019) as enabled by the academic HPC providers. Doing so, the suppliers are able to keep up with the need for developing innovative approaches and products for the OEMs (Hafner & Modic, 2020; Kurpjuweit, Reinerth, & Wagner, 2018).

The focus of empirical interest of present discussion are the organizations geographically located in the Danube Region: SMEs working in the automotive or electronics industries as industry representatives on one hand, and academic HPC providers, as science representatives on the other. The empirical part of the article is evolved around qualitative research, employing focus group method, conducted in all 14 countries5 of the Danube Region. Data was collected within InnoHPC6 project.
The main research aim is in exploring the dynamics and characteristics of University-Industry networking interactions anticipating collaboration between SMEs and academic HPC providers in the Danube region. The research is structured around two main research questions:
RQ1: How are networking interactions initiated and structured between the SMEs and academic HPC providers in the countries of the Danube Region?
RQ2: What are the hinderers of networking interactions between SMEs and academic HPC providers in Danube Region?

[5] The countries of the Danube Region are Germany (Region of Baden Württemberg), Austria, Czech Republic, Slovakia, Slovenia, Hungary, Romania, Moldova, Ukraine, Bulgaria, Montenegro, Bosnia and Herzegovina, Serbia, and Croatia

[6] InnoHPC project co-funded by European Union, ERDF and IPA funds under Danube Transnational Programme, Interreg Danube. The project was led by Faculty of Information Studies under the number DTP1-260-1.1. http://www.interreg-danube.eu/approved-projects/innohpc

To be able to respond to the main research questions, the authors will elaborate the conceptual model placing in centre the role of networking interactions for efficient collaboration between university and industry. The distinctions between strong and weak network ties will be analysed and discussed for better understanding of the dynamics of University-Industry interactions. As the original contribution of the article, we show how trust is build and what hinders the establishment of University-Industry networking interactions in the Danube region. The case study limits to relations between academic HPC centres and SMEs working in automotive or electronics industries in the Danube Region.

The paper is structured in the following way: firstly, the main theoretical starting points are set. After that we describe the method of data collection and data analysis. In the second part of the article, we provide results and discussion with conclusions.

2 Scenarios for the University-Industry networking interactions and collaboration between HPC centres and SMEs

The starting point of the present discussion is a process known as technology diffusion (Kolar & Besednjak Valič, 2021), applied to the case of potentials the suppliers of OEMs can develop by exploiting the technological advances of academic HPC providers. In their book (Kolar & Besednjak Valič, 2021) argue, the technology diffusion in the Danube regions flows to the east along the stream of the Danube region. HPC providers, in our case, academic institutions linked to Universities, are increasingly embracing of what is being called the third mission of the universities (Centobelli, Cerchione, Esposito, & Shashi, 2019; Etzkowitz & Leydesdorff, 2000; Wardani, Sabandi, Setyowibowo, & Andriyati, 2024). Within the concept of the third mission of the universities, the universities are expected to engage in the mission of economic development (D. Modic, Lužar, & Yoshioka-Kobayashi, 2023), namely in exploration and identification of innovative ideas, which are transformed into new products (Balasubramanian, Yang, & Tello, 2020). Along with this, the developmental trajectories of the Danube Region (Besednjak Valič, Kolar, & Lamut, 2022) elaborated and confirmed three potential scenarios of University-Industry collaboration. It is those three scenarios that fit the developmental performance-based grouping of countries of the Danube Region. Those are competitively advanced, competitively moderate, and competitively lagging countries (Besednjak Valič, Kolar, & Lamut, 2020; Schwab, 2018), where the main charateristics of Univeristy-Industry collaboration fit the

following: competitively advanced countries report more Univeristy-Industry collaboration, and competitivelly lagging countries report almost non-existent University-Industry collaboration (Besednjak Valič et al., 2022).

The case we are discussing is to some extent peculiar, as it places SMEs to a somehow demanding position – to be able to participate at network interactions with Academic HPC providers, they must firstly reach the stage of technological development to be able to be suitable interactions counterpart (Cunningham, Damij, & Modic, 2022). The HPC technology works as a promising tool to be used to increase of competitiveness of particular innovation systems (Koller, Struckmann, Buchholz, & Gienger, 2015). However, if SMEs intend to work with the HPC technologies, this requires of them an initial stage effort (Ziegler et al., 2014) particularly with respect to employee skills (Zarza, Lugones, Franco, & Luque, 2012). (Suklan, 2019) offers an insight into the state of the art of the relationships between SMEs from the Danube region, similarly (Cunningham, Damij, Modic, & Olan, 2023), working in either automotive or electronic industries, and academic HPC providers by conducting a gap analysis on supply and demand. According to (Suklan, 2019, p. 53), 70,5% of SMEs believe cooperation with academic HPC providers could foster the proliferation of HPC technology, but as of 67,5% respondents were never included in any international project related to promotion of usage of HPC technologies. SMEs in the Danube region in general do not take part in formal networks, and only small portion of them participate in any form of clusters. More than 50% of Danube region SMEs, according to (Suklan, 2019) either do not have the information nor believe that other SMEs use HPC technologies to increase their innovation capabilities. Additionally, nowadays, the HPC infrastructure remains a costly investment (Sajay & Babu, 2016) and maintenance costs for HPC are decisive moment for SMEs (Botelho Junior & O'Gorman, 2022). As SMEs in particular lack skills to use HPC, much of the access occurs through the cloud (Lu, Damij, & Whalley, 2022). Access through the cloud eases the possibility of creating the internationally dispersed networks, however some research show, the actors (in design innovation) with lower innovator capacity engage in such networks (Qiu, Cano-Kollmann, & Mudambi, 2022). Apart from that the issues of trust are in place when engaging is such networks of collaboration (Jelovac, Ljubojević, & Ljubojević, 2022).

3 Networking and the role of social capital for University-Industry networking interactions

As said, creating effective collaborative relationships between universities and businesses can be beneficial at different levels (Tereshchenko, Salmela, Melkko, Phang, & Happonen, 2024). Among those levels, there are individual organisational level, university levels and most importantly, inter-organisational networks level (Tereshchenko et al., 2024). In order to be successful in network collaboration, social capital is required (Fric, O'Gorman, & Rončević, 2023; Dolores Modic & Rončević, 2018). Social capital is defined as "the sum of actual and potential resources embedded within, accessed through, and derived from the network relations possessed by an actor or social unit" (Hazleton and Kennan, 2000; King et al., 2019; Nahapiet and Ghoshal, 1998, p. 243; Theodoraki et al., 2018). The key contribution of Nahapiet and Ghoshal to social capital theory is the demonstration of the influence of the underlying components of social capital on the conditions necessary for collaboration and transfer of knowledge, while Tsai and Hsu (2018) discuss the effect of social capital on knowledge heterogeneity. Nahapiet and Ghoshal (1998) identify different dimensions of social capital (Lan & Luc, 2020; Rezaei, Jafari-Sadeghi, & Bresciani, 2020), which allow us to identify the conditions that need to be ensured within the networking interactions between University and Industry. It is important to note that effective social networks facilitate the transfer of knowledge between organizations, as the ties within networks influence the availability and exchange of information and knowledge while also contribute to creativity, efficiency (Sözbilir, 2018) and regional development (Grillitsch & Nilsson, 2022). Based on this, the network ties, as the structural dimension of social capital, determine the network configuration, namely the structure of the social network. Along with this, the network ties also determine the accessibility to potential organizations in the network (M. Granovetter, 1985). Trust inevitably plays a role in relation to the rise and fall of regional industrial specialisations (Grillitsch & Nilsson, 2022) and weaknesses in networks hinder the evolution of innovation systems (Besednjak Valič, Kolar, Lamut, & Pandiloska Jurak, 2023).

The structural dimension of social capital represents a kind of "hardware" of social networks (Adam & Rončević, 2003) that explains the ways how to access different actors and initiate interaction for knowledge sharing. In the context of the structural dimension, there are two ways of looking at social capital (Burt, 1992, 1997, 2001). The first seeks to shed light on the relevance of social structure as

access to the actor. In the attempt to acquire specific resources, it answers to the basic questions of who and what. The second, on the other hand, highlights the social structure as capital in itself, answering to the question of how. The search for answers to the how question is irrelevant (Burt, 1992), as actors are supposed to play an active role in the construction of their social structures. In such a condition, if an actor knows how to design an (organizational) structure, then he also knows whom to include in that structure (Burt, 1992).

Having said all this, we conclude that the presence and absence of network ties, along with network configuration, are among the most important aspects of the structural dimension of social capital. This approach clearly illustrates a situation where actor's contacts are embedded in the social network. It is actors' ties that contribute to actors' achievements within or outside the group. The same goes for organizations in our case and interactions among them.

The structural dimension of social capital, in the context of building trust and collaboration relationships, reflects the organization's needs to access or interact with others firstly, then developing trust in order to acquire or exchange resources (technology) that they do not have or lack and evolve collaboration relationship. Actors, in given case academic organizations and industrial organizations are resource holders. The relationships among them can only exist through ties. But ties can be strong or weak. The strong ties perception is oftentimes associate with frequency of interactions, where the opposite, the rarity of contacts symbolises the weaker relationship between actors (M. S. Granovetter, 1973). Strong ties are, in principle, established between long-term partners. However, strong ties between partners usually imply the possession of access to the same information or knowledge resources or even sharing common technologies.

The main deficit of weak ties is noted in the inability to transfer complex knowledge. In University-Industry relations and the development of innovation, the knowledge is complex, so when speaking about University-Industry relations, the ties between the partners cannot be only weak. Complex knowledge is difficult to transfer for two reasons. The first is willingness and the second is ability (Hansen, 1999). The transfer of complex knowledge requires more effort and, in some cases, it can be transferred solely by observation or demonstration. Therefore, the transfer of more complex knowledge is believed to be easier through close ties, as these involve additional motivation, willingness to help (Reagans &

McEvily, 2003) but also patience and time needed to conduct proper observation. Based on this, the failure of weak ties to adequately support the transfer of complex knowledge is reflected in the recipient's need to interpret and modify the unencoded transmitted knowledge on his or her own (Hansen, 1999).

4 Methods and data

For the purposes of the article, the authors analysed data collected within the InnoHPC (InnoHPC, 2017) project. The project was funded by the EU and the funds are referred to below. Data collection took place in 14 countries along the Danube region in period between May and October 2017. The countries involved in the research were the following: Germany (Baden- Württemberg region), Austria, Czech Republic, Slovakia, Hungary, Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro, Romania, Bulgaria, Moldova, and Ukraine. A total of 92 respondents took part in 14 focus groups. The focus groups were deliberately shaped to include the experts from the triple helix (Ranga & Etzkowitz, 2013) consisting of: (a) Academic HPC centres, (b) SMEs operating in automotive or electronics industries, and (c) policy makers. The experts were selected and invited to participate in the discussions based on their prior and current activities in the fields of technology transfer and cooperation between academia and industry.

The interpretative paradigm structured the research process (Alase, 2017; Lamut & Macur, 2012; Smith & Shinebourne, 2012) and data analysis. A phenomenological aspect was introduced further down the analysis process (see also Miller et al., 2018). The authors used a multi-stage qualitative content analysis approach for the interpretation of the data. The process was conducted in the following manner. In the first phase, the data was collected by focus groups. The focus groups discussion was audio recorded and diligently transcribed. While transcribing, the researchers made sure the meanings and opinions stated within the focus group remained intact. In the second phase, the transcripts were arranged and inserted into a coding table with same questions and pertaining responses presented within a single line. After that we conducted the first rough reading. In the subsequent step, the data was arranged according to the two main research questions, according to the key detected topics. The final step included the open coding of data. All authors participated in the process to ensure the mutual agreement and understanding of results interpretation. In Table 1 the authors

provide the table elaborating the number of participant experts per country.

5 Results and discussion

The results are fully elaborated within the Table 2. As a general observation the main findings show several interesting network characteristics and characteristics of networking evolving between SMEs and academic HPC centres in the Danube region. The first joint characteristic concerns the general attitude between SMEs and academic HPC centres, where the two spheres seem to exhibit certain level of general distrust. This distrust seems s to be deriving from discrepancy in understanding the main way of functioning. Additionally, the different needs of organizations seem to additionally stem the detected mistrust. However, in cases where the collaboration networks between the University-Industry organizations are already established, such networks are most characterised by the need for technology diffusion. In countries, where the technology diffusion is greeted, the cooperation culture between organizations is easier and consequently, the collaboration networks are easier to establish. The co-called cooperation culture is arising partly from the cooperation tradition, and is further nurtured also through joint projects. In cases of less cooperation tradition, the mutual trust between organizations is based on inter-personal trust. Within this context, the industry is recognised as the main initiator of the network relationship however, it is within the academic HPC centres where a certain level of conservativism in thinking is detected. This holds true also for the usage of the HPC among SMEs and towards ICT novelties in general. Such particular stance seems to be connected with low critical mass and small markets of some countries under scrutiny.

An interesting concern is mentioned when it comes to technology transfer as result of established collaboration. The public perception of such collaboration can be noted as negative in some cases. The policy rules on private organizations not having access to publicly funded HPC infrastructure additionally steam such interpretations. When discussing the networks creation between SMEs and academic HPC centres, the observation is made that sometimes top-down approach in development of innovation policies are not adequate and in line with the needs of the environment. Additionally, too heavy reliance on EU funds in this context can back fire, as it causes competition and rivalry between national organizations on

one hand and leaving insecure funding after the projects end on the other.

Focusing at the proposed RQ1 the following response is below:
RQ1: How are networking interactions initiated and structured between the SMEs and academic HPC providers in the countries of the Danube Region?
Based on the results summarised in Table 2, we can conclude there are three main aspects needed to be taken into account when discussing on how the networking interactions are initiated. Here, the first to mention, is the aspect of key initiator of the network. From the results it is seen, there is no general rule to who is the key initiator of the network. However, it seems that the industry acts as the key initiator of the network in the countries with more developed industrial spheres. We can potentially relate this to a longer industrial tradition and orientation towards new innovation paradigms, like Open innovation (Chesbrough & Crowther, 2006), but also with the existence of the entrepreneurial mindset (Cunningham et al., 2023). Apart from that, when discussing the question of key initiators of the University-Industry network, some respondents noted the presence of general distrust between the Science and Industry spheres, the same as (Jelovac et al., 2022). This was especially emphasised in less developed countries of Eastern Danube Region and can be explained by less developed innovation systems. Additionally, for less developed industrial spheres, less interest exists in academic research and exploitation of research results along with small market reach and little critical mass of innovative firms. As a result of potential distrust, the main characteristic of trust building is a strong person-to-person orientation. In countries where the general distrust is less present and University-Industry relations have longer traditions, the trust is easier to establish. Additionally, sometimes negative public perceptions of University-Industry collaborations can be seen as fraud, especially in cases where academic HPC centres are publicly owned. Tu sum up, in general it seems actors are reluctant in networks initiation, due to above mentioned reasons.

RQ2: What are the hinderers of networking interactions between SMEs and academic HPC providers in Danube Region?
When speaking of the main characteristics of networking interactions in the Danube region it seems the focus group participants emphasise predominantly the tradition of cooperation, or sort of culture, that stems also the processes of technology diffusion and

knowledge exchange. It is emphasised that that without tradition where organizations are open to adoption of new technologies the University-Industry networks are harder to establish. This finding goes nicely in line with findings on the cliquishness of university licensing networks (D. Modic et al., 2023). On the part of SMEs, reluctance is detected when it comes to creativity and technological novelties, and also new knowledge from academia, especially in the field of supercomputing. In this sense, the SMEs do not recognise the opportunities offered by supercomputing. On the other hand, the academic HPC centres exhibit negative attitudes towards entrepreneurship. Among legislative obstacles also, insufficient IP protection in several countries was emphasised as a hindrance to network creation, along with mismatched innovation policies that were adopted using top-down approaches.

Having said all above, as one of the main hinderers of University-Industry collaboration in the field of HPC is the HPC infrastructure itself. Namely, the technology behind supercomputing is expensive and electricity consuming. Its maintenance is demanding and the usage requires highest levels of knowledge. Apart from this, in all publicly owned academic HPC centres the HPC infrastructure was funded by public funds and therefore the infrastructure is the subject of exclusion of usage of equipment for private sector. Additionally, the market issues are sometimes the hinderers of networks of collaboration, as the markets are small in Danube region and the number of innovative SMEs has not yet reached the critical mass for University-Industry collaboration to stem up. Lastly, the research participants outlined a peculiar role of EU funding when it comes to networking interactions. Namely, the role of EU funding is seen twofold. Firstly, there is an emphasis on positive view, where funded transnational cooperation as means to encourage trust building is positive. However, the respondents questioned the long-term sustainability of such approach, as straw networks, as they describe it, especially in forms of formal networks, last only for the project lifetime. Weak ties are able to be formed among the organizations but with limited long-term impacts. This especially holds true for National cross-sectoral networks. Such networks too often operate at only informal level and face problems with confidence. Additionally, the EU funding was recognised as potentially counterproductive – as it was said to encourage rivalry between national organizations when competing for funds since lack of funds was several times emphasised as one of the main sources of competition in the first place. Nevertheless, we can conclude the possibilities to establish

weak ties exist and it is up to individual organization to consider what path is the best when deciding whether to engage in University-Industry collaborations in the first place. In such cases it is evident the EU and countries are attempting to establish the environment where the structural holes (Burt, 1992) between University and Industry would decrease and organizations would be able to bridge them and establish networks of collaboration.

6 Conclusions

The main contribution of this paper is to understand the peculiarities of network initiation processes in countries of the Danube region. Shortly, we argue, that key initiators of network interactions is subjected to the overall cooperation realities. In such reality, a situation of public prejudice towards cooperation stem distrust between organizations. In certain cases, the collaboration of SMEs with academic HPC centres is additionally diminished by high infrastructure and knowledge demands nested in overall weak innovation systems. The networking interactions occur easier and with more trust in the countries with longer tradition of knowledge transfer and technology diffusion.

As the state is able to be an active agent in generating regional development through its policy formulation and implementation (Steen, Lund, & Karlsen, 2023), the authors elaborate several roles of the state, however the role of regulator is questioned here. Results of the research demonstrate the oftentimes the role of regulator is not performed adequately, especially in competitively lagging countries. In such cases, the top-down approach for policy making is not considered proper way of addressing the questions of University-Industry collaboration. On the other hand, at the EU level, the policies supported by the EU fundings do provide their share of positive aspects and encourage a certain level of networks, but those networks seem to remain at the level of weak ties and rarely develop into long term collaboration networks. The situation is in general related to the level of economic development, where the critical mass of innovative SMEs capable of HPC technology adoption is better.

With respect to this, we can conclude, the structural holes (Burt, 1992, 2004) between University and Industry are larger in certain countries. This seems to hold particularly true for the countries of competitively lagging countries of the Danube Region. In those countries each sector tends to develop in own pace and manner and is either not technologically ready or not willing to establish stronger ties. Additionally, another problem of competitively lagging countries

is noted as one main hindrance of establishing networks of collaboration – the detected reluctance towards implementing ICT and initiating University-Industry networking interactions. Further research is in place to determine the level of impact of cognitive frames (Beckert, 2010) on the processes of establishing networking interactions. These last results demonstrate the further need to assess the role academia can play in stemming regional development.

Use of Generative AI and AI-assisted technologies: The authors have not used generative AI and AI-assisted technologies when preparing the text.

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Table 1: Number of expert participants per focus group

No.	Country	No. of participants
1.	Austria	6
2.	Czech Republic	6
3.	Germany (Baden- Württemberg)	7
4.	Slovenia	15
5.	Bulgaria	6
6.	Hungary	10
7.	Romania	5
8.	Slovakia	6
9.	Croatia	5
10.	Bosnia and Herzegovina	4
11.	Moldova	4
12.	Montenegro	3
13.	Serbia	10
14.	Ukraine	5

Source: (InnoHPC, 2017)

Table 2: Key themes and key findings of the qualitative research

Key theme	Key findings
Key initiator of	Key initiator is sometimes the industrial sphere

network	itself, especially in countries like Slovenia and Czech Republic, where in countries like Germany (Baden- Württemberg), and Austria, the academic HPCs are the main initiator of networks, actively seeking partners in industry.
Public views on networking	In some countries with exception of Germany (Baden- Württemberg) and Austria, the public perception of cooperation between publicly owned academic HPC centers and private originations can be considered as fraud, therefore the establishment of cooperation ties is burdened with fear of prejudice.
Technology diffusion tradition and policy making approaches including funding	In more advanced countries, like Germany (Baden-Württemberg), Austria, the tradition of cooperation and technology diffusion is detected. Key organizations are open, both nationally and internationally to engage in knowledge sharing. The latter supports the HPC uptake of SMEs, contributing to the further development of HPC in SMEs. An obstacle to the formation of national networks in countries like Germany (Baden- Württemberg), Austria, Czech Republic, Slovenia, Hungary, Slovakia, Bulgaria and Romania is also the spontaneous, top-down, national innovation technology policy. This top-down approach is problematic because national policy adopts innovation and technology strategies recklessly and/or even without consulting experts in higher education and/or industry, thus creating a misunderstanding of the needs between them. In the same countries, the national policy encourages innovation-driven cooperation. A key player in cross-border cooperation in Germany (Baden- Württemberg), Austria, Slovenia, and Czech Republic is the higher education sphere, and this cooperation is supported by public financial incentives. The rest of the countries highlight the lack of (public) financial resources as a barrier to integrating the higher education sphere into international networks.

Inclusion in formal networks	In addition to national networks, cooperation in cross-border/international networks are also seen as positive, with some differences between countries. While Croatia, Bosnia and Herzegovina, Serbia, Montenegro, Moldova, and Ukraine are interested in cooperation and are seeking, in particular, additional financial resources, the condition for joining them to international networks is very often that participation is free of charge for them. Hungary, Slovakia, Bulgaria, and Romania are integrated into cross-border international networks because this is also a guiding principle for national policies, as cooperation is based on the principle of added value for the development of innovation. Both national and EU policies in these countries support such cross-border R&D-oriented cooperation. In these cross-border networks, both the higher education and industrial spheres are included. National cross-sectoral networks, in particular with regard to cooperation between the higher education and industrial spheres, in the Hungary, Slovakia, Bulgaria, and Romania repeatedly have the form of straw networks. They operate only at the informational level and have problems with confidence.
Trust among actors/organizations	The field of innovation and technology transfer demands certain level of trust for the networks to be established. In countries, where cooperation between SMEs and academia has longer tradition, such trust is easier to establish. In Croatia, Bosnia and Herzegovina, Serbia, Montenegro, Moldova, and Ukraine, confidence is only being established through cooperation with R&D organizations who show a tendency to participate in joint R&D projects. Croatia, Bosnia and Herzegovina, Serbia, Montenegro, Moldova, and Ukraine are countries where organizations build confidence, above all, at a personal level. In Germany (Baden- Württemberg), Austria, Slovenia, and Czech Republic, with a tradition of

	collaboration and advanced networking developed, there is a high level of trust, which took time to develop. In the countries of the Danube Region, cross-border international (HPC) networks are often created as a result of the involvement of organizations active in EU projects. Participation in European projects, however, has, in nearly all the countries in focus, two obstacles to (even greater) expansion: (1) legal differences between countries, and (2) ineffectiveness of a sustainable approach of EU projects for cross-border cooperation.
Double role of EU funds: to steam networks and to increase rivalry and competitiveness among actors/ organizations	Numerous organizations in the Danube region countries rely on support from EU project funding, especially regarding HPC infrastructure funding. However, in Germany, Austria, Slovenia and Czech Republic representatives of SMEs and HPC academia admit that, while the struggle for the EU funds among competitive projects, relations can turn into the form of rivalries, which breaks or eliminates trust. Overall intensity of social networks is weakened precisely by this amplified competition and rivalry within the networks, and lack of funding, which is the main cause of competition in the first place.
Access to HPC infrastructure	Businesses show distrust of the higher education sphere, as the higher education sphere does not allow access to (its) HPC infrastructure to private companies.
Conservativism in cooperation and adoption of new technologies	In all researched countries the notion of conservativism in network creation between SMEs and academic HPC centers were noted. The key organizations are oftentimes reluctant in establishing cooperation networks with organizations from different sphere. The obstacles in the cooperation between the higher education and industrial spheres in Germany (Baden- Württemberg), Austria, Slovenia, and Czech Republic are noted in the inadequate legal frameworks regarding the protection of intellectual property and in the weak transfer of technologies from universities to industry/business

	The formation of social networks in the countries of the Danube region, is also affected by the potential negative orientation of the SMEs towards creativity and new technologies, which is evident with the negative attitudes towards technological novelties. The academic HPC centers exhibit negative attitudes towards entrepreneurship.
General distrust between academia and industry	Hungary, Slovakia, Bulgaria, and Romania highlight the lack of trust between industries within the same sector and companies entering different (inter) sectoral networks and point out that there is a lack of trust between partners, which impairs the exchange of information and data. In addition, the problems of cooperation between organizations in national networks are also recognized in the lack of communication and occasional misunderstanding of network needs.
Lack of interest on new knowledge from academia	Networking between academic HPC centers and SMEs is weakened also because the SMEs do not show its interest in academic research and the applicability of the results of these researches; SMEs do not recognize opportunities to use new technologies, industry clusters are unaware of the usefulness of HPC services in industrial R&D, and because SMEs are ineffective (or not at all) using new ICT services.
Market issues	In certain cases, the organizations are faced either with the problems of the small size of the local market, or the too low critical mass of innovative organizations, the relevant public-private partnerships legislation.

Source: (InnoHPC, 2017), authors' own interpretation