

Clusters as platforms for business-research (B2R)/research-business (R2B) relations

Country Report – Hungary

Table of content

Summary	4
Introduction	6
Current status of cooperation between business and research institutions	8
Overview of the cluster development in recent years	16
Motives for B2R/R2B cooperation in cluster organizations and benefits for the stakeholders	27
Forms of B2R/R2B cooperation in cluster organizations	33
Factors conditioning B2R/R2B cooperation in cluster organizations	42
Challenges and barriers for B2R/R2B cooperation	46
The best practices of B2R/R2B cooperation in cluster organizations that can be transferred and implemented in other V4 countries	48
Conclusions and recommendations	56
Literature	59

Table of Figures

Figure 1 Number RO/UNIV in the 10 interviewed clusters	11
Figure 2 Cooperation of clusters with innovation structures	12
Figure 3 Types of entities that initiated the B2R / R2B cooperation – replies from cluster managers	13
Figure 4 Share of cluster companies actively included in RDI cooperation with RO/UNIV	14
Figure 5 Types of entities that initiated the B2R / R2B cooperation – replies from the RO survey	15
Figure 6 Change in members of interviewed clusters in the past three years	23
Figure 7 Strategic innovators vs technology recipients in interviewed clusters	24
Figure 8 Impact of COVID on cluster development	25
Figure 9 Impact of COVID on cluster development – replies from the online survey	26
Figure 10 Motives for B2R cooperation in clusters – replies from cluster managers	27
Figure 11 Types of innovation as a result of cooperation between companies and RO/UNIV	28

Figure 12 Impact of cooperation with RO/UNIV on technological progress of the firms	29
Figure 13 Benefits of cooperation achieved by the help of the cluster organisation	30
Figure 14 Motivation for RO/UNIV to pursue cooperation with the cluster organisation.....	31
Figure 15 Motivation for RO/UNIV to pursue cooperation – dispersion of replies	32
Figure 16 Forms of cooperation between firms and RO/UNIV – number of replies of cluster managers	33
Figure 17 Types of cooperation activities between firms and RO/UNIV – number of replies from cluster managers	34
Figure 18 Models of cooperation between firms and RO/UNIV – projects organised and managed by individual members – distribution of replies from cluster managers	35
Figure 19 Models of cooperation between firms and RO/UNIV – projects organised and managed by the cluster manager – distribution of replies from cluster managers.....	36
Figure 20 Number of tasks/activities that RO/UNIV carry out when cooperating with the cluster organization and its members	36
Figure 21 Type of tasks/activities that RO/UNIV carry out when cooperating with the cluster organization and its members – number of replies from RO/UNIV	37
Figure 22 Relevance of listed forms in the cooperation with the cluster organization – replies from RO/UNIV	38
Figure 23 Relevance of listed forms in the cooperation with the cluster organization – dispersion of replies from RO/UNIV	39
Figure 24 Share of profiles of activities indicating the time each of them occupies with regard to RO/UNIV cooperation with the cluster organization and its members.....	40
Figure 25 Applied models of R&D cooperation with the cluster organization and its members by RO/UNIV	40
Figure 26 Main financial sources for collaborative R&D&I projects in last three years in average – replies from cluster managers.....	42
Figure 27 Most important funding sources for RO/UNIV cooperation with the cluster organization and its members in the last 3 years – replies from RO/UNIV	43
Figure 28 Type of results associated with RO/UNIV cooperation with the cluster organization and its members – replies from RO/UNIV	44
Figure 29 Hindering and facilitating factors of cooperation between business and research institutions in clusters – replies from cluster managers.....	46

Table of Tables

Table 1 The characteristics of interviewed clusters in Hungary	21
--	----

List of Abbreviations

B2R	Business to research
CMO	cluster management organisation
CO	cluster organisation
EDOP	Economic Development Operational Programme
EDIOP	Economic Development and Innovation Operational Programme
EDIOP+	Economic Development and Innovation Operational Programme Plus
EIS	European Innovation Scoreboard
ERDF	European Regional Development Fund
ESCA	The European Secretariat for Cluster Analysis
ESF	European Social Fund
HEI	higher education institutions
ICT	Info-communication technologies
IPR	Intellectual property rights
IT	Information technology
PCT	Patent Cooperation Treaty
RDI, R&D&I	Research and Innovation and Development
RO	research organisation
R2B	Research to business
SME	Small- and medium-sized enterprise
S3	Smart Specialisation Strategy

Summary

This report deals with how research and business entities cooperate in clusters in Hungary. The report is an output of the project “Clusters as platforms for business-research (B2R)/research-business (R2B) relations co-financed by the Governments of Czechia, Hungary, Poland and Slovakia” through Visegrad Grants from International Visegrad Fund (Visegrad Fund project No. 22030333).

The report is based on in-depth interviews with managers of 10 accredited clusters in Hungary, on online surveys filled in by representatives of universities and research organisations and follow-up interviews with them. Interviews and surveys were conducted in 2021.

Contents and findings of this report provide input for the V4 report, which is a joint report of the project partnership. Moreover, the conclusions of the report will be discussed in a workshop with relevant Hungarian stakeholders including policy makers, research organisations and universities and cluster practitioners.

Our desk research shows that research and business cooperation is discussed and analysed in Hungary and need for substantial improvement is identified and articulated in strategic documents – among others a standalone measure of EDIOP+ Priority Axis No. 2 is dedicated to this subject. However, it can be observed that clusters and role of clusters in bringing together business and research is at best marginal in analyses or policy papers in Hungary. It must be noted that a fresh national cluster strategy is under construction at the period of writing this country report, which - once published - could give a different angle to the above.

Our primary research with cluster managers and with representatives of research organisations and universities show the following results:

- Interviewed clusters have on average 2.3 universities and 0.6 research organisations as members
- All of the interviewed clusters report about cooperation with some kind of innovation structures
- Knowledge partners, cluster member companies and cluster management take a similar share in initiating R&DI cooperation between firms and research organisations/universities within interviewed clusters.
- 7 of the 10 interviewed clusters have not lost a member in the past three years and 6 of the 10 interviewed clusters have grown in terms of cluster members.
- In each of the interviewed clusters there are cluster member companies that carry out R&D activities (“strategic innovators”) continuously. This result confirms that accredited clusters in Hungary are active in R&D activities not only through the knowledge partners but also through the cluster member companies

- The strongest motives for cooperation between firms and knowledge partners are: human capital development, access to research, access to new knowledge and business opportunities
- The relevance of geographic proximity has not been confirmed in our research
- Even though financial sources are important but may have adverse effects
- In Hungary, cluster managers and cluster management organisations are active in facilitating cooperation projects through direct and indirect activities but are not frequently managing or organising cooperation projects.
- Occasional cooperation is more frequent than long-term agreements
- Domestic cooperation is dominant over international cooperation
- Clusters diverge significantly in their international cooperation: some are very active, some rather passive.
- Capacity constraints at SMEs have not been ranked either by cluster managers or RO/UNIV respondents among the significant barriers.

Cluster managers and representatives of research organisations and universities offered 7 best practices as follows:

- Living Lab Network
- Demand driven “needle-type” trainings
- Balatonfüred Knowledge Centre of the Budapest University of Technology and Economics
- IT HUB Pécs
- InnoWood Interreg Austria-Hungary project
- Start me Up! Idea contest and mentor programme
- Dedicated call innovation projects of cooperating accredited cluster members (EDOP-1.3.1/B)

Introduction

This national report was written under the project “Clusters as platforms for business-research (B2R)/research-business (R2B) relations co-financed by the Governments of Czechia, Hungary, Poland and Slovakia” through Visegrad Grants from International Visegrad Fund (Visegrad Fund project No. 22030333).

The research goal of the project is to identify models of collaboration between business and research facilitated by cluster organizations, based on the mapping of best practice across V4 countries. According to theoretical cluster model, such collaboration should emerge in every cluster as one of the cornerstones of its existence. The project also seeks to demonstrate why both companies and research organizations benefit from working together.

The project focuses on cluster organizations and avenues for collaborative efforts between business and research within the territorial ecosystems in Czechia, Hungary, Poland and Slovakia, in accordance with the quadruple helix model. Additional goals of the project are:

- to examine the motives for B2R/R2B partnerships between business and research institutions in cluster organizations,
- to identify factors which shape B2R/R2B in cluster organizations,
- to identify forms of B2R/R2B in cluster organizations,
- to define the best practices of B2R/R2B in cluster organizations that can be transplanted and implemented in other V4 countries.

According to the project’s methodology, the research presented in this national report was conducted in three steps:

1. Carrying out in-depth interviews with cluster organizations’ managers to define the role of research organizations in clusters organizations.
2. Conducting a survey among research organizations to collect data on the different forms of collaboration and their main benefits.
3. Conducting interviews with the representatives of research organizations to expand on the data collected in the survey.

The purpose of the in-depth interviews was to gather qualitative information on the role of research organizations in cluster organizations, to assess the added value of collaboration, and to identify forms of collaboration that work well. The interviews provided information on (i) the lessons learned so far and (ii) the expectations and needs for policy instruments that may improve B2R/R2B partnerships. This part of the study served to identify the main motives for partnering up, the outcomes of collaboration, and the factors that may determine its forms and scope. The interviews helped diagnose the most important challenges and barriers to be taken

into account when designing prospective support instruments. The subsequent steps of the study built upon the interviews with cluster organizations' managers. The purpose of the survey among research organizations was to gather up-to-date, comparable data on the forms of collaboration with enterprises, as well as the resultant benefits for research organisations and universities. To further explore collaboration from the perspective of the science sector, semi-structured interviews were carried out with employees of the research organisations that deal directly with companies belonging to cluster organizations.

The present national report elaborates upon the data collected during the study. The whole project encompasses four national reports: for Czechia, Hungary, Poland and Slovakia. The purpose of the reports was to analyze the role of cluster organizations in facilitating partnerships between enterprises and research organizations. The national reports present key findings about such partnerships and good practice that can be disseminated.

The national report is structured as follows. The first chapter provides an analysis of the current status of collaboration between business and research institutions. The second chapter gives an overview of the cluster landscape in the country, as well as the national cluster policy in recent years. It also includes a profile of cluster organizations that took part in the study. The third chapter provides information on the motives for pursuing B2R/R2B in cluster organizations and the related benefits for the stakeholders, including factors that have motivated researchers to pursue collaboration with a cluster organization and its members. The fourth chapter gives an overview of the forms of B2R/R2B functioning in practice among cluster organizations. The fifth chapter discusses the factors shaping (and, in particular, promoting) B2R/R2B collaboration in cluster organizations. The challenges, barriers and detrimental factors were analysed in the following chapter to answer the question of what can hinder B2R/R2B. In the respondents' opinion, the cost of collaboration brought on by administrative overheads is the most significant barrier. The seventh chapter presents good practices of collaboration in cluster organizations that can be transplanted and implemented in other V4 countries. Finally, the last chapter provides recommendations and conclusions, focusing on suggested measures to improve cluster policy and to support cluster organizations.

The Authors of the report would like to express their sincerest gratitude to all the respondents that kindly agreed to participate in the study and to share their knowledge, opinions and thoughts.

Current status of cooperation between business and research institutions

According to the European Innovation Scoreboard 2021, Hungary is an emerging innovator. Its Summary Innovation Index is at 67.9 relative to EU 2021 (100). Hungary's strengths include foreign doctorate students (103.6), government support for business R&D (151.0) and medium and high tech-goods exports (131.0). The largest lags compared to EU average are in doctorate graduates (35.1), R&D expenditures in the public sector (32.7), SME business process innovators (16.4), PCT patent applications (37.3), design applications (27.9), and employment in innovative enterprises (19.2).¹

Ratio of enterprises carrying out innovation activities is 28.7% - far below the EU average (50.1%). There is a substantial difference in the indicator according to enterprise size: more than half of the large enterprises conduct innovation activities, whereas the indicator stands at 36.5% for medium-sized companies and only at 25.8% for small companies. Between 2016 and 2018 only 10% of innovative enterprises had cooperation with higher education institutes and 3.6% of them with public research institutes. The poor cooperation indicators have spurred a number of public programmes in recent years that address B2R and R2B interaction:²

- Open laboratories: use of laboratory equipment for innovative SMEs
- Higher Education and Industry Collaboration Centres (FIEK):³
 - joint R&D activity and knowledge creation that involves both the university and the business actors. Knowledge building and sharing activities are integral parts of the project.
 - R&D activity performed (on demand) by the university according to the needs of a business entity as a customer. The university itself is not necessarily directly involved in the knowledge creation, the production of outstanding R&D results or knowledge sharing. Rather, the company implements an intra-firm innovation process to which the university's overall contribution is usually low.

¹ A major change regarding the legal status, management and operations of the Hungarian universities is under progress at the same period when this report was delivered. In its legal sense, the overwhelming majority of the universities transfer from public educational bodies to private universities providing public tasks. Rights are transferred to an asset management foundation, whereas the infrastructure will be owned by the university. According to the vision of the change, this facilitates channelling in additional financial resources for the operations of the universities and a quicker response to competitiveness and RDI challenges.

² Bacsa, L. Bodzay, B.: TIP Working Party Knowledge Triangle Project (2015-16). Case study: Hungary "KT Enabling policy", OECD

³ NRDI Office (2019), "Centres for Higher Education and Industrial Cooperation, Hungary: Case study contribution to the OECD TIP Knowledge Transfer and Policies project", National Research, Development and Innovation Office

- Science and Innovation Parks: Major infrastructural investments to create large innovative areas (often through green-field investment), in which both research entities and companies settle.
- University Innovation Ecosystem:⁴ The programme encourages universities as knowledge bases to establish and ensure the result-oriented operation of organisational units that facilitate the commercialisation of scientific results produced at universities, fosters cooperation between the academia and the business sector in research, development, technology and innovation, and increases the active participation of universities in the R&I framework programmes of the European Union. Programme objectives include the creation of an online platform that helps to align the portfolio of RDI services of universities with the specific demand of the business sector. The match-making function of the platform makes it easier for businesses to contact and partner with universities.

The Hungarian Academy of Sciences put forward its recommendations for the improvement of the national innovation ecosystem and for the stimulation of cooperation among business and research in its White Paper in 2020. The White Paper⁵ groups B2R cooperation in three segments that can be stimulated by different public measures:

1. Cooperation of R&D intense spin-off companies and their founding university/research organisation
2. Cooperation for solving simple technical issues
3. Long-term cooperation for strategic R&D activities

The recommendations of the White Paper are as follows:

1. Public programmes, public incentives shall be adjusted to the varying needs and objectives of the actors that participate in cooperation
2. Policy makers should better understand the needs of enterprises and universities/research organisations
3. Objectives of cooperation and concrete measures shall be defined
4. For a more effective support of B2R cooperation public research jobs and the assessment system of researches need to be changed
5. Researchers must be equipped with business knowledge
6. Regulations on patents and other intellectual property rights need to be created in research organisations
7. Technology Transfer Office should start operations in the research institute network of the Academy

⁴ <https://nkfih.gov.hu/for-the-applicants/university-innovation>

⁵ Boda Zsolt, Magyar Tudományos Akadémia: EÖTVÖS 2020+ PROGRAM, Fehér Könyv az MTA Kiváló Kutatóhelyeiről és az Innovációról. 2020

The Economic Development and Innovation Operational Programme Plus (EDIOP+) is the major competitiveness programme for the 2021-2027 programming period. Measures in the programme are co-financed by the ERDF and ESF. The Programme is still under negotiation with the European Commission, nevertheless drafts have been published for public consultation from 2021 on. Priority Axis No. 2 of EDIOP+ is Research, Development and Innovation. The priority axis breaks down intervention in three groups:

1. Support to knowledge creation through infrastructure investment and capacity building
2. Stimulating knowledge transfer through the support of cooperation
3. Stimulating utilisation of knowledge through the increase of RDI activities of companies

Intervention No. 2. dealing with knowledge transfer through cooperation claims that the 21-27 period will focus support to long-term cooperation instead of project-based cooperation that characterised the 14-20 period. The intervention lists four types of knowledge transfer institutions as follows: (1) competence centres, (2) science and innovation parks, (3) national laboratories, (4) science centres. Clusters are not mentioned at all in this regard.

The National Smart Specialisation Strategy (S3) 2021-2027 has been adopted in 2021. Accredited clusters were invited to form the S3 strategy through the territorial innovation platforms. The Strategy defines measures to strengthen the RDI system in Hungary. These are:

1. Improving the operational efficiency of the RDI system
2. Strengthening knowledge flows in the innovation ecosystem
3. Training and development of RDI-related workforce
4. RDI performance of companies

Under the measure “Strengthening knowledge flows in the innovation ecosystem” a number of potential instruments are listed that include: *“targeted support programmes to encourage mobility of researchers to and from the corporate sector; more market-oriented research; provision of appropriate physical infrastructure (e.g. shared laboratories, incubators, accelerators, science parks, innovation clusters); the introduction of transparent and appropriate incentives for cross-sectoral mobility, including appropriate appointment and promotion criteria in the public sector to assess the exposure of researchers to companies; the involvement of private sector representatives in the governance of public sector RDI actors; and the promotion of knowledge transfer programmes*

From the above it can be seen that research and business cooperation is discussed and analysed in Hungary and need for substantial improvement is identified and articulated in strategic documents – a standalone measure of EDIOP+ Priority Axis No. 2 is dedicated to this subject. However, it can also be concluded that clusters and role of clusters in bringing together business and research is at best marginal in analyses or policy papers in Hungary. It must be noted that a fresh national cluster strategy is under construction at the period of writing this country report, which - once published - could give a different angle to the above.

Clusters are rather considered as tools for increasing competitiveness of SMEs. In fact, clusters are mentioned only once in EDIOP+ in the SME competitiveness priority axis (Priority Axis 1) but only in connection with the roles of the national SME agency, i. e., among others the national SME Agency shall keep regular contact to clusters.

In contrast to the text of the operational programme, clusters do play a role in the SME calls for proposals published under the EDIOP+. These are technology development type calls that do not put stress on B2R cooperation. First such calls have been published from summer 2021 and in a number of calls, cluster member companies are treated preferentially in the project selection system. Practically, it means that 5 points in a 100-point scoring scheme are awarded to such applicants that are members of an accredited cluster.

Looking at the results of our primary research we can confirm that all the ten interviewed Hungarian accredited clusters have knowledge providers (universities or research organisations) among their members. In fact, this is a precondition to qualify as accredited cluster in Hungary. If we look at the number and type of knowledge partners then we can see that 10 clusters have on average 2.3 universities and 0.6 research organisations as members. All the interviewed clusters have at least one university member, four of them have exactly one but also there are two clusters that have four university members. As for research organisations, half of the interviewed clusters have no research organisations among their members, four of them have one research organisations and two of them have 2 such organisations. The minimum requirement for cluster accreditation is at least one UNIV/RO as member. As such, most of the interviewed clusters overperform the minimum criterion.

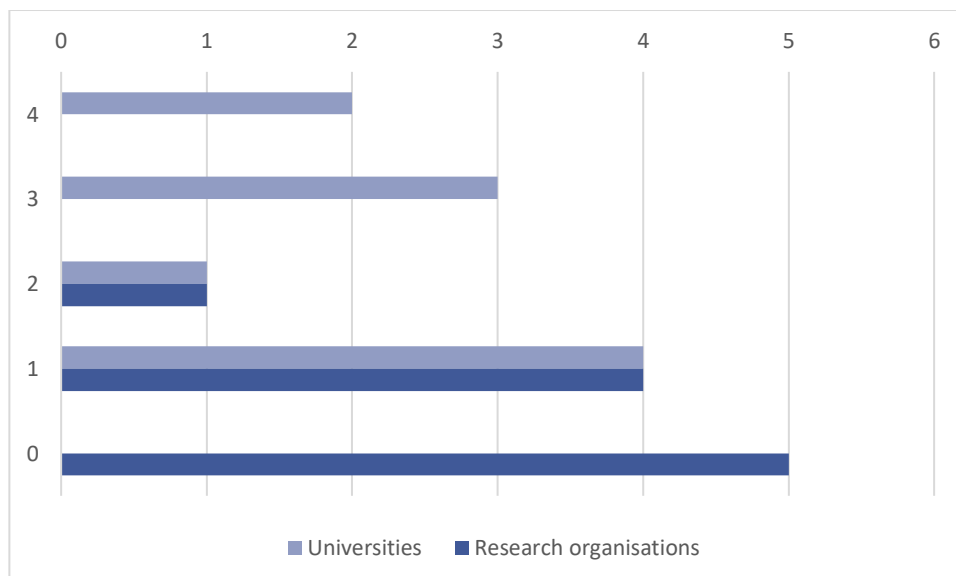


Figure 1 Number RO/UNIV in the 10 interviewed clusters

Source: own elaboration based on the interviews with cluster managers

All of the interviewed clusters report about cooperation with some kind of innovation structures and nine of them are involved in more than one type of cooperation. The most frequently mentioned cooperation is the membership in Territorial Innovation Platforms. Seven of them are members of these platforms that are organised on county-basis⁶ in Hungary by the National R&D&I Office. The platforms are responsible for the update of the National S3 strategy for the 2021-2027 programming period.

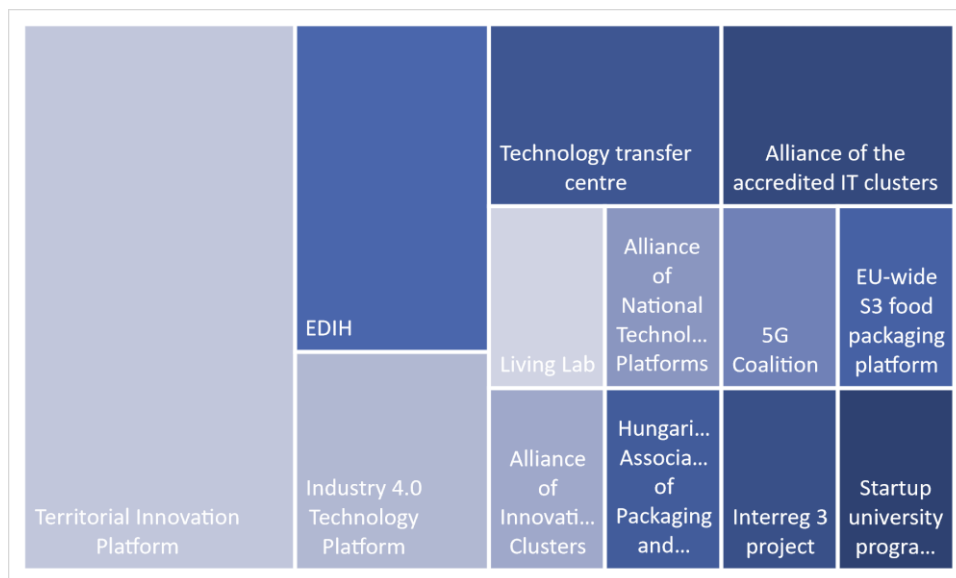


Figure 2 Cooperation of clusters with innovation structures

Source: own elaboration based on the interviews with cluster managers

3 clusters talked about prospective membership in forming European Digital Innovation Hub⁷ initiatives. Two of the clusters confirmed cooperation with technology transfer centres of universities. Further types of mentioned innovation structures were:

- Living Lab initiative
- Industry 4.0 Technology Platform⁸
- Alliance of Innovation Clusters
- Alliance of National Technology Platforms
- 5G Coalition⁹

⁶ There are 19+1 (Budapest) counties in Hungary.

⁷ <https://digital-strategy.ec.europa.eu/en/activities/edih>

⁸ <https://www.i40platform.hu/en>

⁹ <https://5g.hu/en>

- EU-wide S3 Food Packaging Platform
- Hungarian Association of Packaging and Materials Handling
- Interreg 3 project
- Alliance of Accredited IT Clusters
- Hungarian Startup University Programme¹⁰

Knowledge partners, cluster member companies and cluster management take a similar share in initiating R&DI cooperation between firms and research organisations/universities within interviewed clusters. Interviewees were not mentioning further stakeholders that would initiate the cooperation. Even though, the first move is close to each other on average, the distribution of the replies varies substantially. Based on our sample the most stable actor in initiating cooperation is the cluster companies. Compared to that, cluster management has a larger volatility in this respect and it is the knowledge partners that have the largest dispersion, that is to say there are some clusters in which research organisations and universities dominate in initiating cooperation whereas they are rather passive in other clusters in this regard.

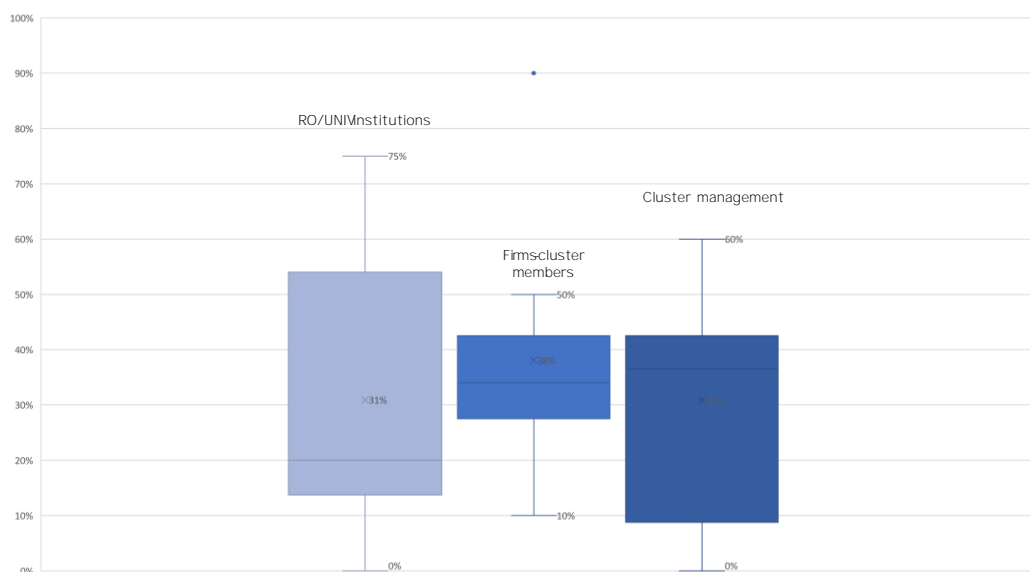


Figure 3 Types of entities that initiated the B2R / R2B cooperation – replies from cluster managers

Source: own elaboration based on the interviews with cluster managers

Nine from the 10 interviewed clusters answered ‘Yes’ to the question whether the cluster management prepares a document of the strategic development of the cluster. It should be noted that the Hungarian accreditation system requires a formal, written strategy from clusters

¹⁰ <https://hsup.nkfi.gov.hu/>

that would like to be accredited, however last accreditations took place in 2018. The in-depth interviews with the cluster managers gave the opportunity to look behind numbers. These revealed that in some cases the strategy is not up-to-date and the accreditation requirement has been the strongest push in formalising a strategy. Each cluster has a vision and a strategy - eventually clusters are established on a joint vision of the members but in some cases not all aspects are formalised or refreshed regularly.

All cluster managers agreed that cooperation with research organisations and universities should be part of the strategic development plan of the cluster and the nine clusters that have a strategy do have a part in it that deals with this issue. This shows clearly that cluster organisations see advantages of cooperation between business and research.

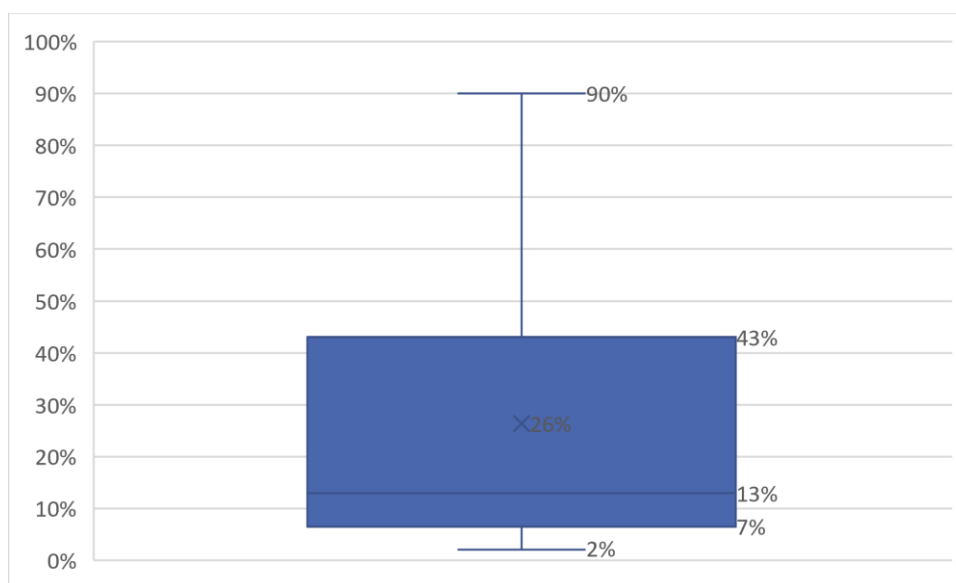


Figure 4 Share of cluster companies actively included in RDI cooperation with RO/UNIV

Source: own elaboration based on the interviews with cluster managers

Replies varied to great extent among cluster managers to the question on the share of cluster member companies that have been actively included in RDI cooperation with research organisations and universities. The median value is 13% meaning that 5 of the respondents indicated a lower share than that. In the upper half of the distribution the shares range from 30% to 90%. This shows a diverging picture in the interviewed sample.

In a similar manner, participation in international RDI projects shows substantial differences in the examined sample. Replies range from 0 to above 100. Two clusters reported no international projects, most of the clusters talked about few territorial cooperation projects with no or marginal RDI content and there is one cluster with huge track record in international RDI projects.

Cluster managers gave the following examples as results (outcomes) in R&D&I projects:

- Innovation vouchers were available for the SMEs as part of the international project.
- The international projects open up opportunities for foreign markets. Participation in such projects is also useful for keeping contacts with foreign partners and for fund raising.
- Cluster members have been involved as subcontractors in project implementation or company staff was on project pay-roll.
- Cluster members benefited from knowledge enrichment
- Networking, internationalisation, exchange of professional experience, product development, market entry, SME-large company cooperation
- Purchase of equipment was done through cluster members. Cluster members implement certain project tasks and activities.
- Product development, overview of international practices
- Mediating cluster members to further projects, training opportunities, recruitment.

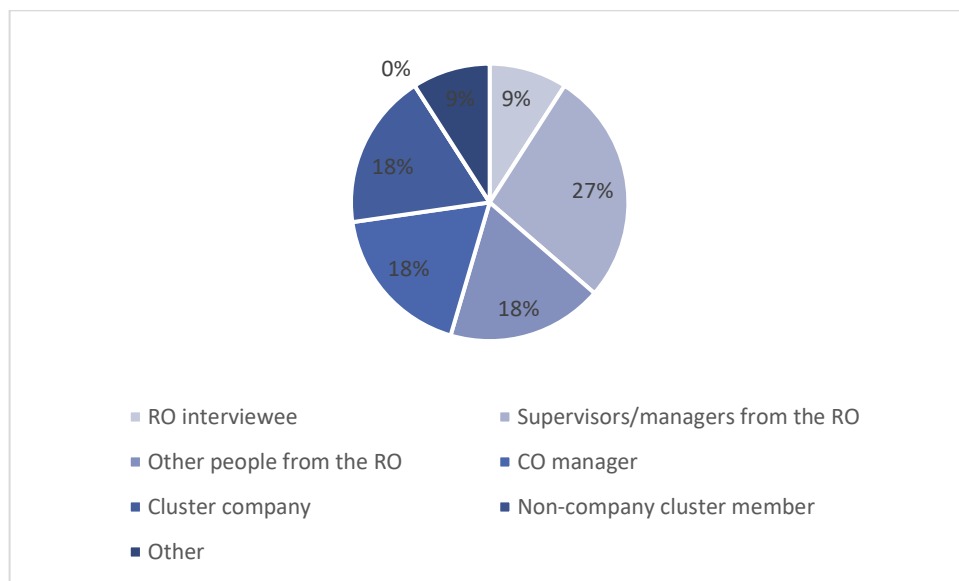


Figure 5 Types of entities that initiated the B2R / R2B cooperation – replies from the RO survey

Source: own elaboration based on the online survey with research organisations and universities

The online survey results with RO/UNIV representatives show that in the majority of cases (55%) the cooperation was initiated by research organisations.

Overview of the cluster development in recent years

Just like in many Central European countries, clusters have proved to be an important tool of governments in Hungary in the past two decades also in Hungary. But – as shown in the previous chapter – clusters are seen more as relevant players of modern industrial policies and a way of reaching and addressing competitive SMEs rather than platforms for cooperation between business and research.

The first clusters were initiated by the Ministry of National Economy in 2000. These clusters can be characterized rather as supplier chains with a top-down approach and relatively large number of members. Since no common goals had been defined these initiatives rapidly turned into apparent organizations and eroded.

Cluster development had become a central issue of the New Hungary Development Plan 2007-2013, therefore a comprehensive economic development program was launched tackling cluster related issues – this was called Pole Programme. Main actions and measures of the Pole Programme were:

- Establishment and operation of the Pole Programme Office (PPO) and its network brokers, a dedicated governmental unit tackling with cluster-related issues
- Launching a 4-stage cluster development model
- Launching the cluster accreditation scheme
- Dedicated funding to start-up co-operations and developing clusters
- Dedicated funding and special calls for the support of joint innovation projects of clusters
- Channelling internationalization and cross-border projects

The Programme resulted in a surge of new clusters in Hungary and strengthening of the mature clusters.

In 2011 the Pole Programme was transformed to the Cluster Development Programme of the New Szechenyi Plan, which is a continuation of most of the activities and measures. Instead of further new clusters, the Cluster Development Programme intended to increase the number of accredited clusters and the number and value of projects that are realised by member companies of accredited clusters.

The application of the multi-stage cluster development model continued with fine tuning of the different cluster-related calls. The accreditation system has been renewed reflecting the priorities of the New Szechenyi Plan.

In 2014 the Hungarian government launched Szechenyi 2020 the framework programme of Hungary for the 2014-2020 programming period.

Cluster development continued forming part of the economic development measures however its priority has been reduced. Measures related to cluster development were embedded in the relevant innovation strategies (Regional and national Smart Specialization Strategies, National R&D&I Strategy, relevant OPs). Policy measures of the predecessor programmes continued, non-refundable grants related to cluster management services were still available, however clusters had to face with much stricter criteria than before. Dedicated calls for joint innovation projects were not available any longer.

The accreditation scheme was last updated in 2016 and the last round of accreditation took place in 2018. Currently the Ministry of Finance is working on a cluster strategy and on the renewal of the accreditation system.

Below we present the entry criteria and selection criteria for the cluster accreditation based on the 2016 rules published on the website of the Ministry of Finance.¹¹

I. Minimum entry criteria for the cluster accreditation

- 1) None of the cluster members has a majority interest in the cluster management organisation (CMO).
- 2) The cluster is managed by the current CMO at least for 1 year.
- 3) The cluster has a multilingual webpage with relevant information on its operation, services, members etc.
- 4) The CMO has no membership in other clusters.
- 5) The CMO should prove that in the past 2 years membership fees have been paid by at least 80% of all cluster members. The amount of the membership fee should reach HUF 25,000 (ca. EUR 80) per month per cluster member.
- 6) Clusters should have a proven track record of 3 years.
- 7) Clusters should have minimum 20 members out of which minimum 15 have its membership at least for 2 years.
- 8) None of any cluster members has a membership in more than 2 different Accredited Clusters.
- 9) Proportion of SME members should exceed 75%.

¹¹ An English language summary on the accreditation scheme and the scaling of the selection criteria can be downloaded from this link:

http://klaszterfejlesztas.hu/content/content/4ffdb63e693227.48747265/hungarian_cluster_accreditation_model_2016.pdf

10) The added value per capita of the SME members should exceed EUR 10,000 in average.

II. Extra requirements for those who intend to renew their accreditation title

11) Minimum one submitted proposal to international programmes since obtaining the last accreditation title.

12) Representation of the cluster on at least 1 international exhibition, fair, workshop in the past.

13) Realization of at least 1 innovation project by the cluster members which has generated at least EUR 160,000 net revenue since obtaining the last accreditation title

III. Selection criteria of the accreditation scheme (scoring)

#	Criterion	Points
I.	Cooperation inside the cluster	20
1	Track-record of the cluster Number of years passed since the foundation of the cluster on the submission date	7
2	Activity of the cluster Number of cluster events and meetings organized by the CMO with minimum 5 participating members per event in the past 2 years prior to the submission. (general assembly is not taken into account)	8
3	Press and media activities Number of press and media releases referring to cluster activities (printed and electronic with the exception of the cluster's and cluster members' website) in the past 12 months	5
II.	Cluster management and the composition of the cluster	30
4	Stability of the CMO Number of years passed since the current CMO has started to manage the cluster on the submission date.	6
5	Costs paid for the membership Costs paid by the cluster members to the CMO for the operation of the cluster in the past 1 year prior to the submission.	7
6	Stability of the membership Ratio of those members who have their membership at least for 3 years on the submission date	7
7	Concentration of the members At least 50% of all members have their seat in the same or neighbouring county as the CMO.	4
8	Service portfolio of the CMO Does the CMO provide/willing to provide at least 1 from the following services: <ul style="list-style-type: none"> • incubation • mentoring 	6

#	Criterion	Points
	<ul style="list-style-type: none"> • coordination of dual training • • suppliers programme 	
III.	International focus of the cluster	24
9.	Participation in international projects Number of supported international projects of the CMO and cluster members during the 2007- 2013 or 2014- 2020 programming period (Horizon2020, COSME, INTERREG, International Visegrad Fund, Danube Transnational Programme, CENTRAL EUROPE 2020, CIP, FP7, South East Europe Programme 2007-13, Central Europe Programme 2007-13, Cross-border Cooperation Programme)	6
10.	Export potential Ratio of export-oriented SMEs to all cluster member SMEs. (The export sales revenue has to be min. 5% of the total net sales revenue.)	6
11.	International activities Number of international events, business meetings with the joint representation of at least 2 cluster members in the past 2 years prior to the submission. The representing members have to participate as exhibitors, presenters).	6
12.	International quality labelling Does the cluster dispose any cluster label of ESCA on the submission date?	6
IV.	Innovation potential and performance	26
13.	Market oriented innovation Number of those cluster projects (self- funded or state- funded) which have generated at least EUR 160.000 in the past 5 years prior to the submission.	8
14.	R&D&I activity of members Ratio of those member companies which have implemented at least 1 R&D&I project (self- funded or state- funded) since 2007 to all member companies.	7
15.	Number of intellectual property rights (IPR) Number of IPRs owned by the SME members of the cluster, with the exception of trademarks.	6
16.	Co-operation with higher education institutions (HEI) and research Institutes Does the cluster have at least 1 HEI or research institute as a member at least for one year on the submission date?	5
	Total	100

Accreditation title cannot be provided if:

- The cluster strategy is not in line with the main development objectives of the underlying call
- Minimum threshold is 50 points
- For those clusters who are applying for the renewal of the accreditation the minimum threshold is 60 points
- Minimum 1 point should be reached through every group of criteria

As opposed to the proliferation of new clusters during the period of 2006-2012, in the past 3-5 years very few new clusters have been established. Overwhelming majority of the clusters established around 10-15 years ago have stopped operations. To a limited extent, merging of clusters could have been observed in the past 5 years. In 2021, there were 26 accredited clusters in Hungary and the Ministry of Finance registers further 19 clusters that function. There could be some additional clusters in the country because there is no formal registration need of clusters.

Majority of the 19 non-accredited clusters have a 5-10 year long track record. Some of them had had previously the accreditation title but they either could or not did not want to renew it. Some of the non-accredited clusters were founded too late to be able to qualify for the last round of the accreditation call in 2018.

Based on figures from the Ministry of Finance, the 26 accredited clusters had together 993 cluster members of which 927 are enterprises. The average number of members in an accredited cluster is 38.

Ministry of Finance started working on a new national cluster strategy in 2021 that will set goals for clusters in Hungary. Based on the strategy the national accreditation scheme will be renewed. Like in previous programming period, clusters may receive dedicated funding for cluster management and internationalisation but new priorities of the cluster strategy will be reflected in the call. The first call under the new competitiveness operational programme (2021-2027) has been launched in summer 2021. This is a large-size call for technology and infrastructure development of SMEs. Members of accredited clusters enjoy preference during the project selection procedure (5 points from a total of 100 are given to accredited cluster member companies). Calls offering similar preferential treatment for cluster members are expected in the future.

Below we present basic features of the clusters that took part in the in-depth interviews we conducted in 2021.

Table 1 The characteristics of interviewed clusters in Hungary

Cluster	Legal form	Predominant field(s) of cluster activity (NACE)	Year of cluster foundation	Number of cluster members
INNOSKART Digital Cluster (INNOSKART Digitális Klaszter)	No legal form. It has a deed of foundation, rules of organisation and operation.	ICT	2006	48
System Science Innovation Cluster (Rendszertudományi Innovációs Klaszter)	No legal form. It has a deed of foundation.	ICT	2006	27
ArchEnerg International Renewable Energy and Building Trade Cluste (ArchEnerg Nemzetközi Megújuló Energetikai és Épít ipari Innovációs Klaszter)	No legal form. It has a deed of foundation.	Energy and environment	2007	77
Hírös Supplier Cluster (Hírös Beszállítói Klaszter)	No legal form. It has a deed of foundation. The cluster has rules of organisation and operaitons.	Production and logistics	2008	47
Information management Innovation Cluster	No legal form. It has a	ICT	2008	54

(Információmenedzsment Innovációs Klaszter)	deed of foundation.				
Omnipack First Hungarian Packaging Technology Cluster (Omnipack Els Magyar Csomagolástechnikai Klaszter)	No legal form. It has a deed of foundation.	Logistics: Packaging	2003	38	
Pharmapolis Debrecen Innovative Pharmaceutical Cluster (Pharmapolis Debrecen Innovatív Gyógyszeripari Klaszter)	No legal form. It was established through a cooperation contract.	Health and medical science	2008	26	
North Hungarian IT Cluster (Észak-Magyarországi Informatikai Klaszter)	No legal form. It has a deed of foundation.	ICT	2007	39	
Pannon Wood- and Furniture Industry Cluster (Pannon Fa- és Bútoripari Akkreditált Innovációs Klaszter)	The cluster has no legal form. It has a deed of foundation. It has a rules of organisation and operations.	Production and engineering	2001	43	
Software Innovation Pole Cluster (Szoftveripari Innovációs Pólus Klaszter)	No legal form. It has a deed of foundation.	ICT	2007	29	

Source: own elaboration

7 of the 10 interviewed clusters have not lost a member in the past three years and 6 of the 10 interviewed clusters have grown in terms of cluster members. Range of growth is broad: there was a cluster that saw a 73% increase in its cluster members. The most moderate increase was 15%. One cluster reported no change in members, and three clusters reported a reduction of cluster members – the largest shrinkage was 25%.

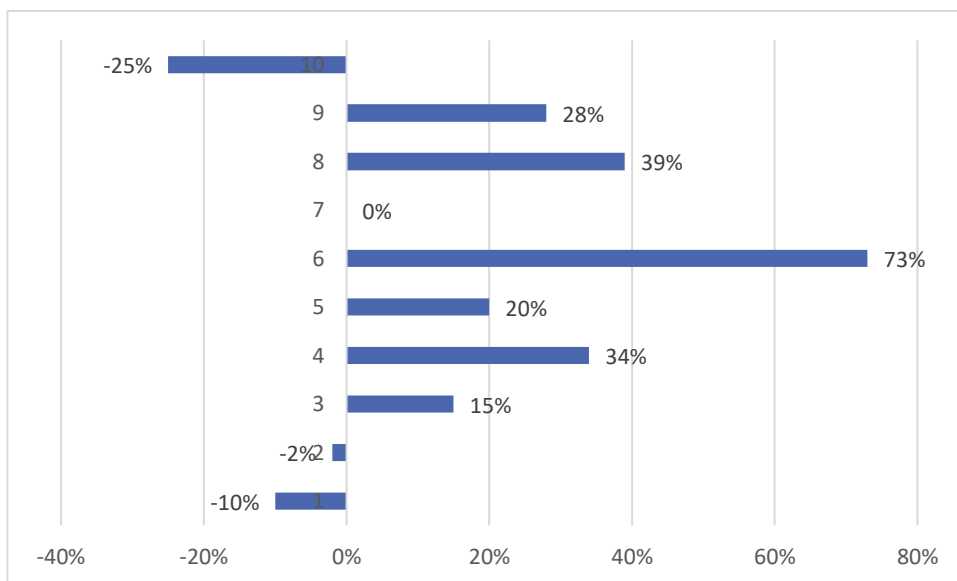


Figure 6 Change in members of interviewed clusters in the past three years

Source: own elaboration based on the online survey with research organisations and universities

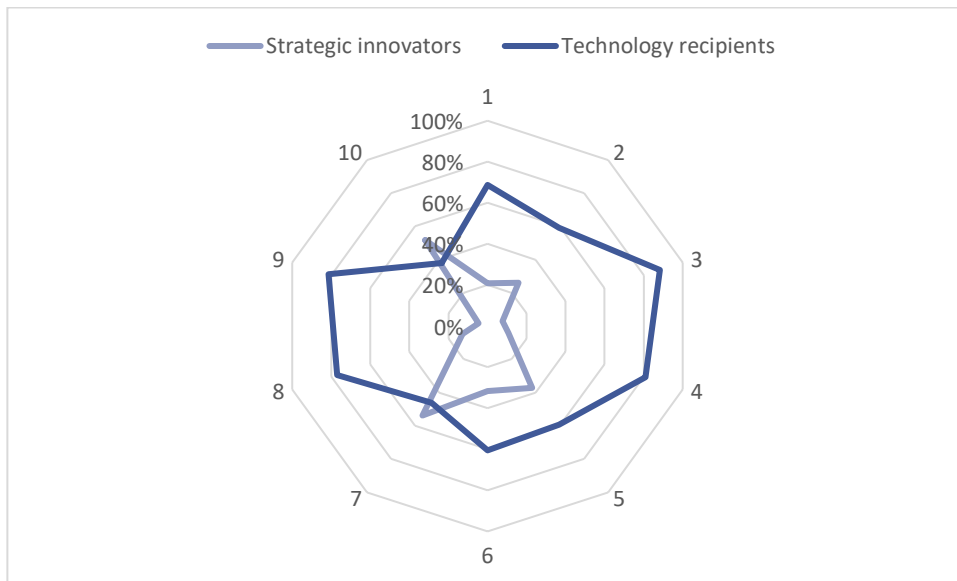


Figure 7 Strategic innovators vs technology recipients in interviewed clusters

Source: own elaboration based on the online survey with research organisations and universities

In each of the interviewed clusters there are cluster member companies that carry out R&D activities (“strategic innovators”) continuously. This result confirms that accredited clusters in Hungary are active in R&D activities not only through the knowledge partners but also through the cluster member companies. Based on the opinion of cluster managers technology recipients (companies that do not have their own research) outnumber significantly strategic innovators in 8 out of the 10 clusters. There are only two clusters in which there are more companies that qualify as strategic innovators compared to technology recipients.

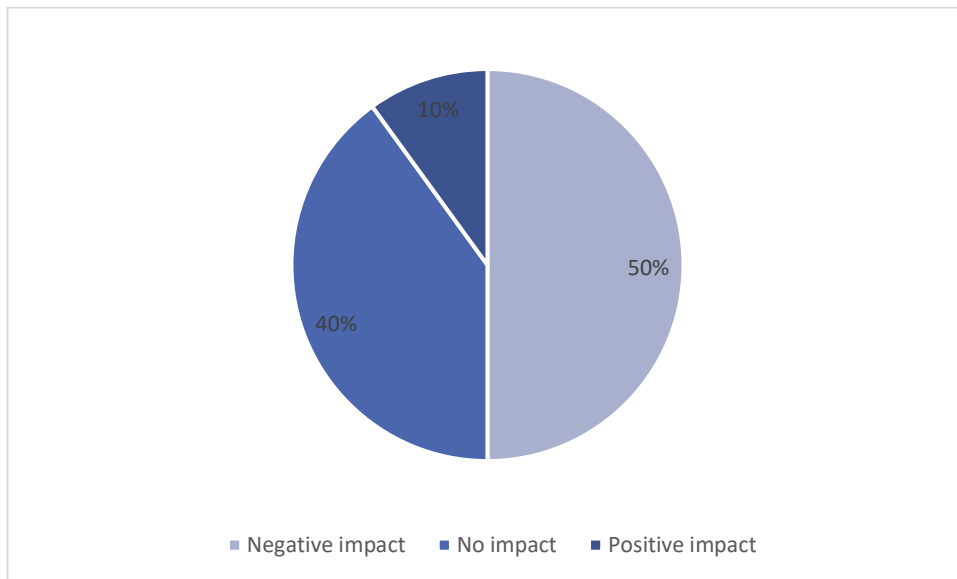


Figure 8 Impact of COVID on cluster development

Source: own elaboration based on the online survey with research organisations and universities

According to cluster managers, COVID had neutral impact on the cluster in 4 cases from the 10 interviewed clusters. 5 cluster managers reported about negative effects, whereas in one case the COVID dynamized the cluster significantly. This latter is due to the primary field of activity for this cluster which is the pharma industry. Among the clusters that suffered negative impact from COVID, there are two clusters in which cluster managers talked about mixed effects:

- In one case, the cluster manager mentioned that cluster members have suffered from COVID in terms of market losses and consequent lay-offs of staff at companies, however the cluster could significantly ease this effect through cluster members overtaking each other's dismissed staff to a large extent.
- In a further case, the negative impact that the cluster members experienced forced the cluster to rethink its operation "on a market basis" and offer "real" services to members. IT companies have shortage of labour, this has been an opportunity for the cluster management since they can easily collect needed competences. An education centre has been established with school-type training that is running well.

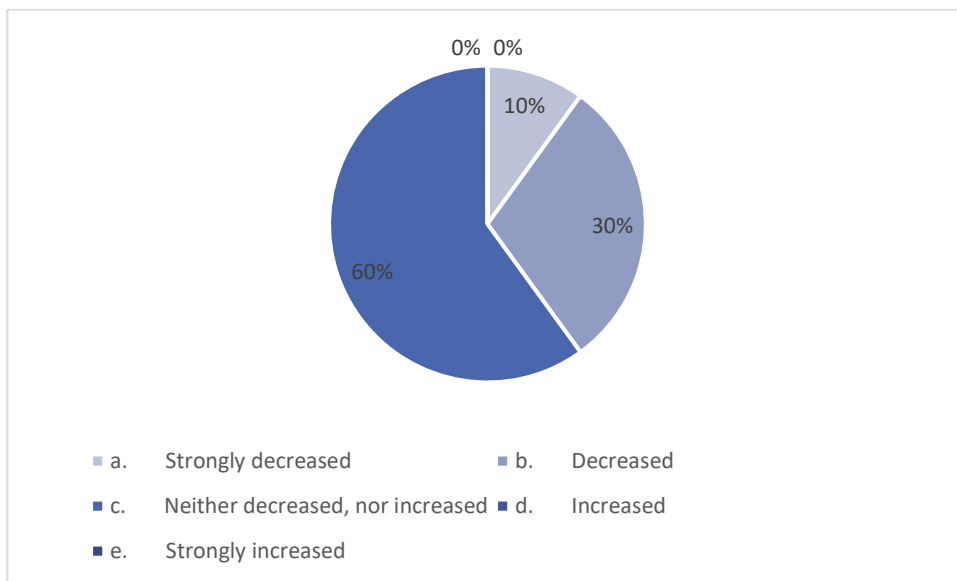


Figure 9 Impact of COVID on cluster development – replies from the online survey

Source: own elaboration based on the online survey with research organisations and universities

In the only survey for the research organisations 10 out of 11 respondents replied on the question asking about the influence of COVID-19. 60% of the respondents had the opinion that the COVID-19 had no influence on the intensity of cooperation with the cluster organisation and its members. 30% of the respondents replied that it decreased the intensity, whereas 10% of the respondents indicated significant reduction in cooperation intensity.

Motives for B2R/R2B cooperation in cluster organizations and benefits for the stakeholders

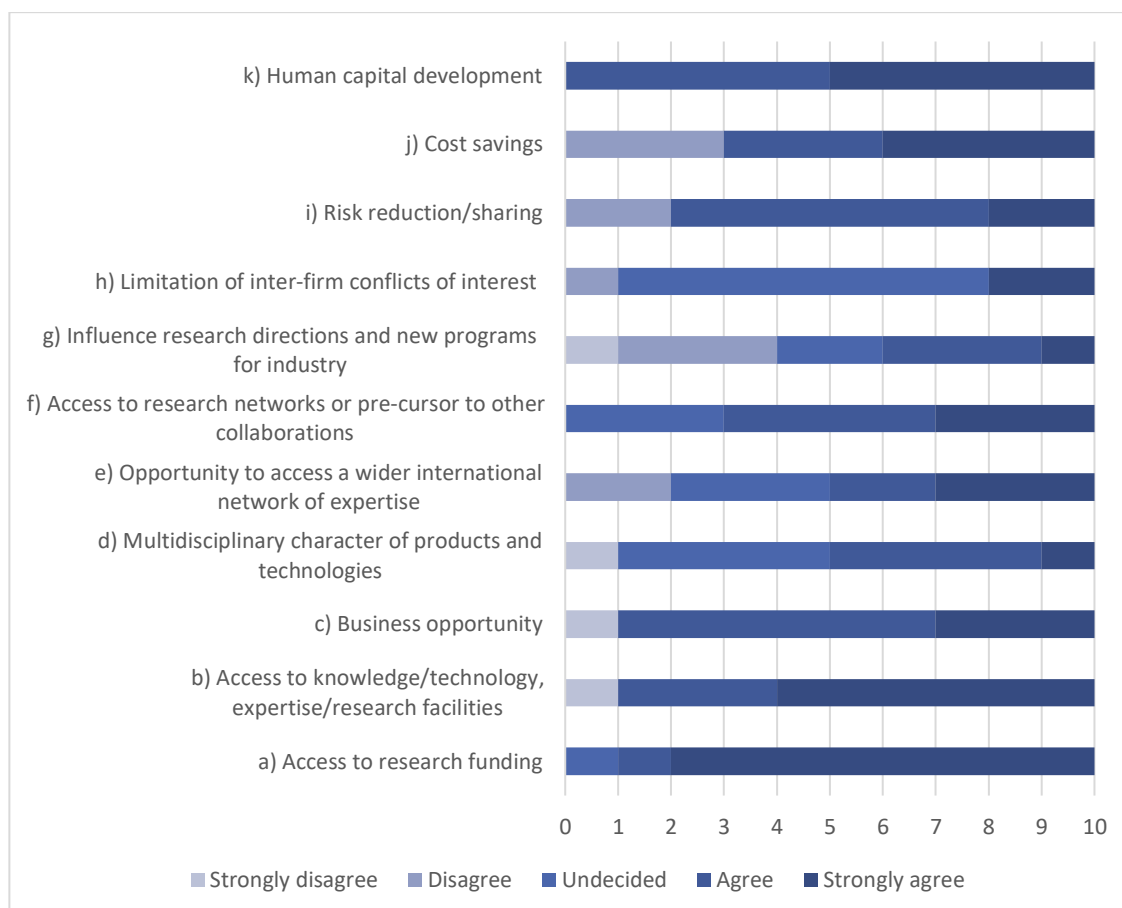


Figure 10 Motives for B2R cooperation in clusters – replies from cluster managers

Source: own elaboration based on the online survey with research organisations and universities

According to the results of interviews with cluster managers the strongest motives for cooperation between firms and knowledge partners are:

- human capital development (strongly agree – 5, agree - 5),
- access to research funding including government grant for research, industrial funding for common R&D projects, research assistance, lab equipment, etc. (strongly agree – 8, agree – 1)

- access to new knowledge, cutting-edge technology, state-of-the art expertise/research facilities and complementary know-how (strongly agree – 6, agree -3)
- business opportunities (e.g. exploitation of research capabilities and results or deployment of IPR) (strongly agree – 3, agree – 6)

8 from the 10 interviewed cluster managers had the opinion that risk reduction/risk sharing is also an important motive, however two cluster managers disagreed with this. There is a similar outcome with regard to cost savings: 7 cluster managers agree with this motive, however 3 disagree. 7 cluster managers supported the factor of access to research networks as relevant motive for the cooperation, 3 were undecided.

Most of the cluster managers were undecided whether limitation of inter-firm conflicts of interest is a true motive for cooperation.

On the other end of the scale we find the factor of *“Influencing research directions and new programs for industry”* since 4 cluster managers did not agree this would be a relevant motive for cooperation.

Clusters managers have been asked about type of innovations in which cooperation between companies and knowledge partners resulted. Product and/or service innovations are the most frequent results, such were mentioned by 6 cluster managers. Cluster managers talked about prototype development and marketed products among product innovations. There was only one positive reply for business process innovation and one for other type of innovations. The result is in line with the findings of the European Innovation Scoreboard for Hungary. Some of the cluster managers underlined that the product innovation was a result of cooperation among cluster companies and cluster knowledge partners however the cooperation was not managed by the cluster. The cluster management might have had a role of facilitation but the cooperation was managed by the participating entities.

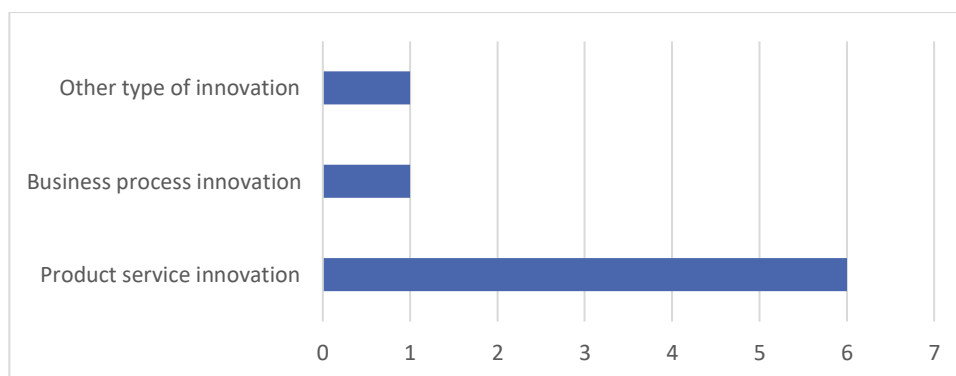


Figure 11 Types of innovation as a result of cooperation between companies and RO/UNIV

Source: own elaboration based on the online survey with research organisations and universities

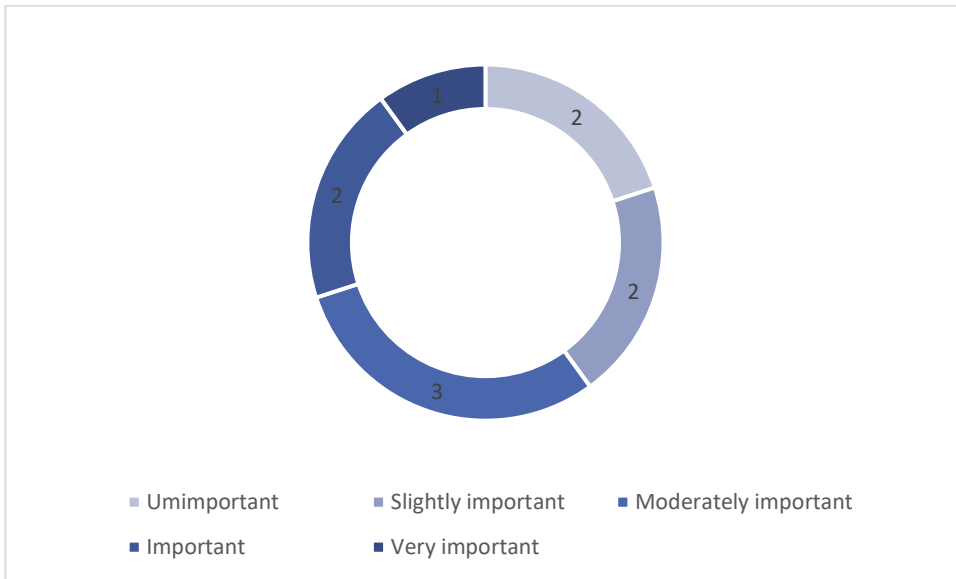


Figure 12 Impact of cooperation with RO/UNIV on technological progress of the firms

Source: own elaboration based on the online survey with research organisations and universities

Cluster managers provided an almost equal distribution of replies to the question that asked about the degree of impact the cooperation with knowledge partners does on technological progress of the firms. On one side the results suggests that in the case of most clusters knowledge partners have some kind of impact on firms' technological progress, but level of impact is different from cluster to cluster.

Benefits of cooperation

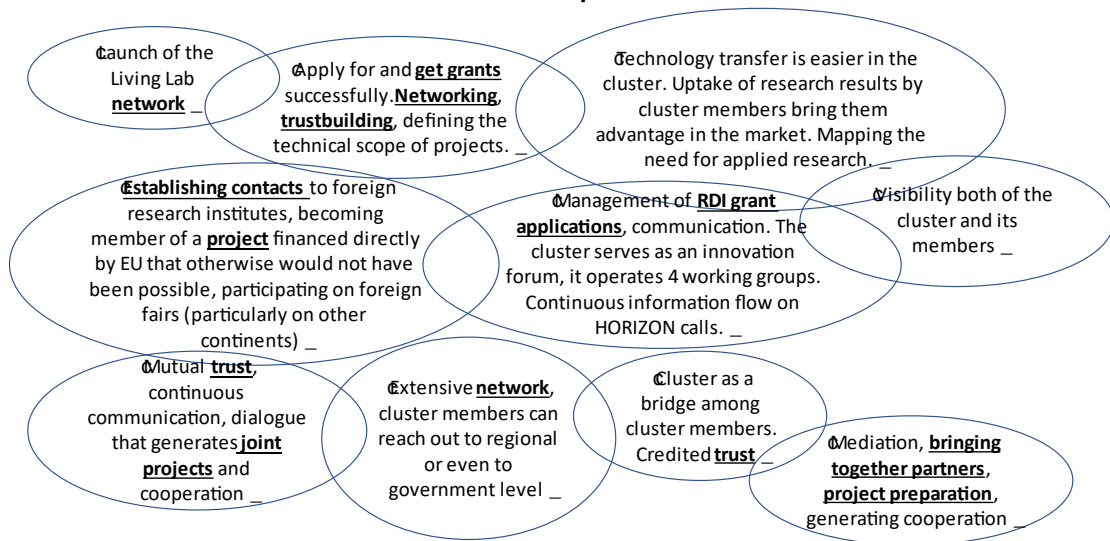


Figure 13 Benefits of cooperation achieved by the help of the cluster organisation

Source: own elaboration based on the online survey with research organisations and universities

All interviewed cluster managers could list benefits for the development and support of cooperation between firms and knowledge partners, which have been achieved by the help of the cluster organisation. The figure above presents the replies provided by cluster managers. The recurring notions have been “trust”, “networking” and “opportunities for projects and grants”.

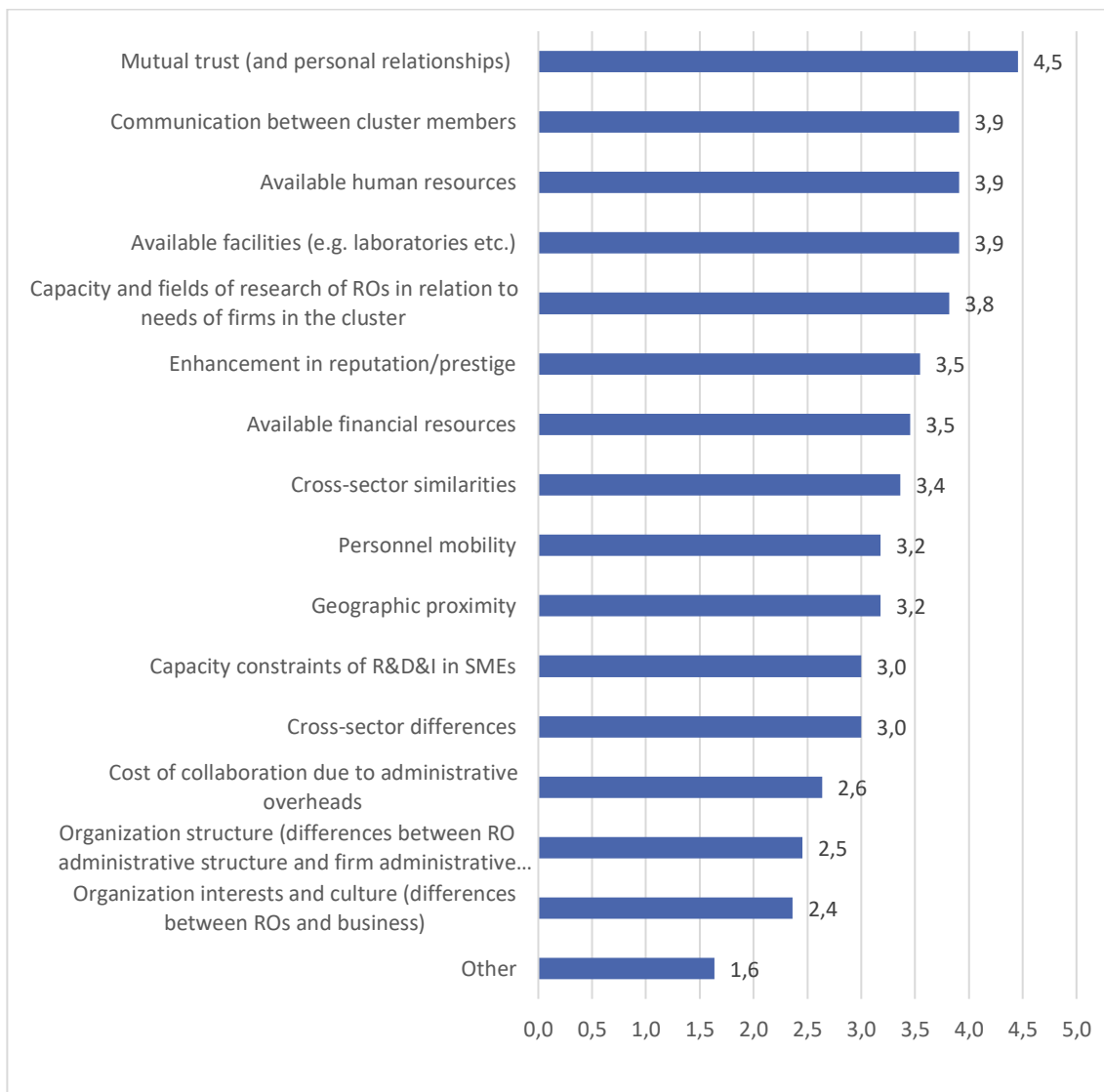


Figure 14 Motivation for RO/UNIV to pursue cooperation with the cluster organisation

5 – significantly facilitates, 4 – facilitates, 3 – neutral, 2 – hinders, 1 – significantly hinders.

Source: own elaboration based on the online survey with research organisations and universities

Among the motivation factors to pursue cooperation with the cluster organization and its members, university and research organisation respondents consider mutual trust by far the most facilitating issue. It comes as an interesting result that available financial resources are only a bit above the neutral factor, and geographic proximity was evaluated as neutral. On average respondents considered the cost of collaboration due to administrative overheads, the differences in organisation structures and differences in organisation interests and cultures hindering factors. However, the outcome comes in a somewhat different angle if we look at the

dispersion behind the averages that is shown in the figure below for some of the factors displayed in the graph above.

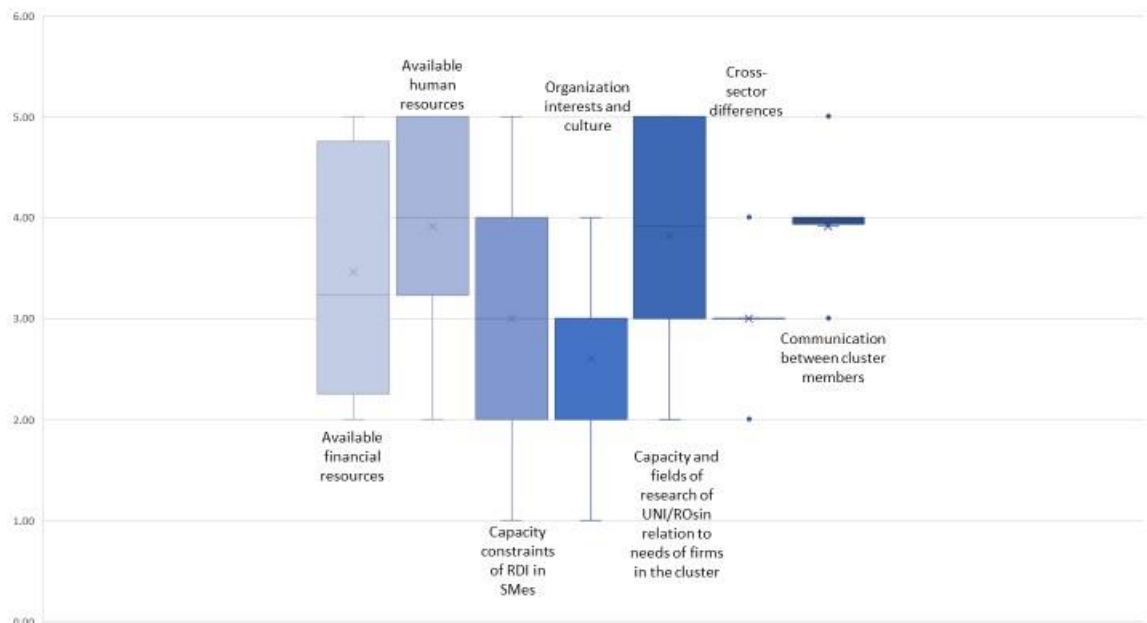


Figure 15 Motivation for RO/UNIV to pursue cooperation – dispersion of replies

5 – significantly facilitates, 4 – facilitates, 3 – neutral, 2 – hinders, 1 – significantly hinders.

Source: own elaboration based on the online survey with research organisations and universities

There is a striking difference of how some of the factors are evaluated by respondents. Even though available financial resources on average are considered as moderately facilitating cooperation on average, respondents have substantially different views on it: some clearly see it as a hindering factor, whereas others think it strongly facilitates cooperation. A potential reason behind the hindering feature of financial resources might be that often it is not private financing but public financing behind the cooperation that is seen as a distorting factor for the cooperation. Capacity constraints to conduct RDI in SMEs seems neutral on average but with large diversion among single responses including replies from strong facilitation to strong hindering. Opposed to these, respondents had almost a unanimous view on the neutrality of cross-sector differences but also on the facilitating impact of communication among cluster members.

Forms of B2R/R2B cooperation in cluster organizations

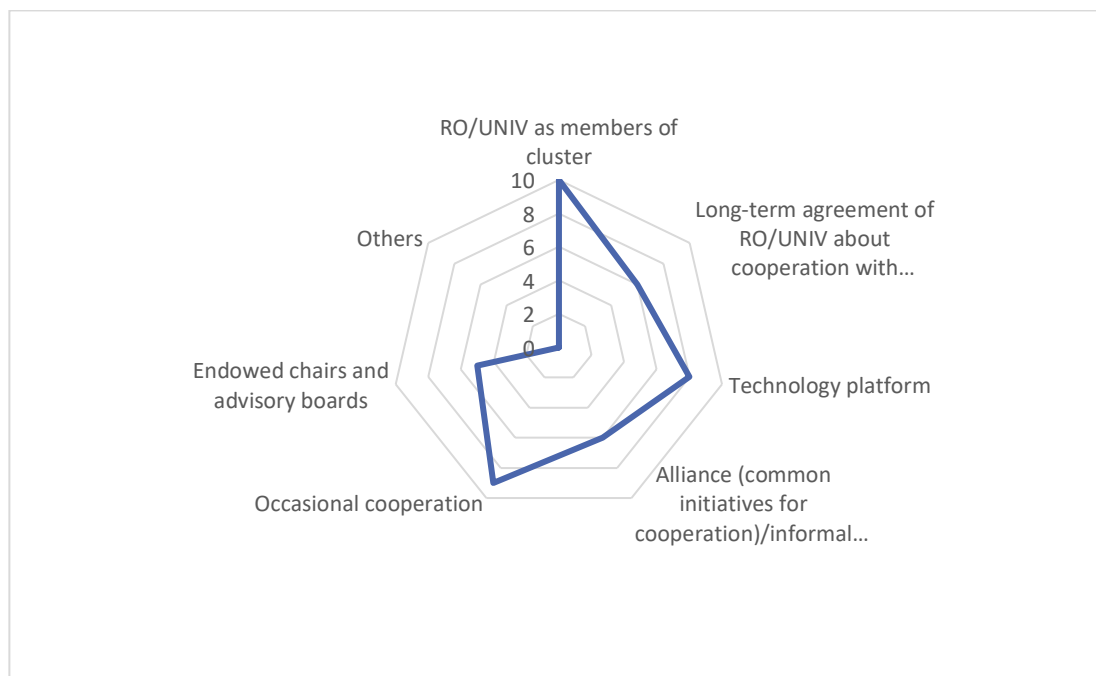


Figure 16 Forms of cooperation between firms and RO/UNIV – number of replies of cluster managers

Source: own elaboration based on the online survey with research organisations and universities

When asked about the forms of cooperation between firms and RO/UNIV within clusters, cluster managers unanimously reconfirmed that knowledge partners are members of their clusters and cooperate with firms. It can also be seen that occasional cooperation is more frequent than long-term agreements. Cooperation in the form of technology platforms is quite frequent too. Half of the respondents indicated that companies endow chairs or take a place in universities/research organisations leading or advisory bodies.

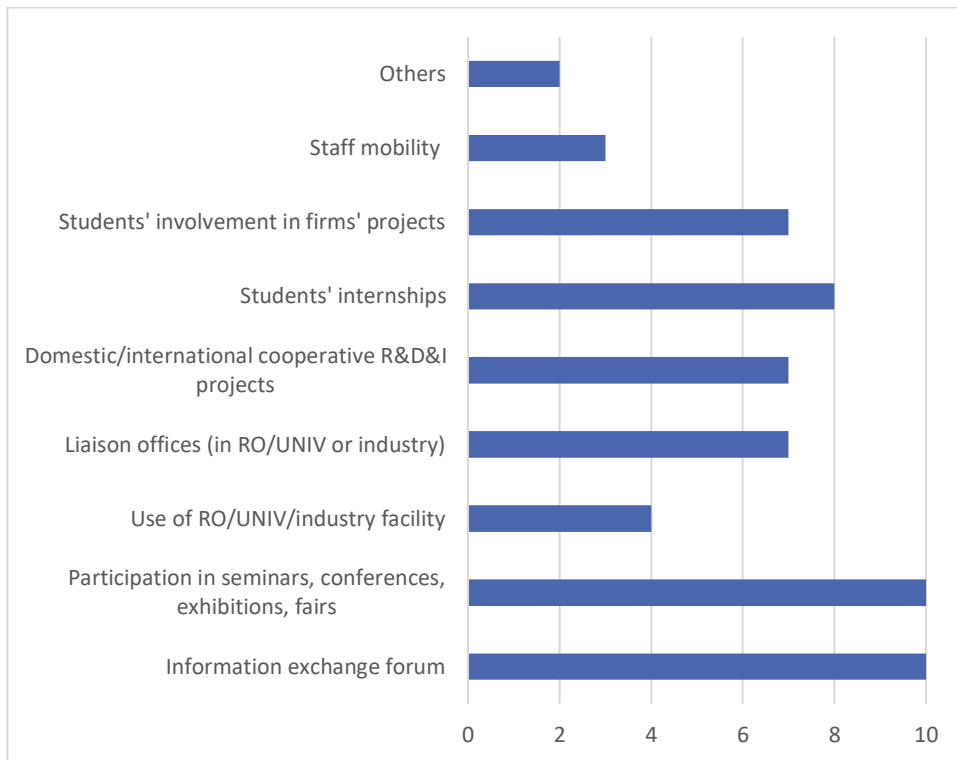


Figure 17 Types of cooperation activities between firms and RO/UNIV – number of replies from cluster managers

Source: own elaboration based on the online survey with research organisations and universities

Various types of cooperation activities are undertaken by cluster members. Information exchange forum, participation in seminars, conferences were mentioned by all interviewed cluster managers. Eight of them talked about students' internships, seven of them about students' involvement in firms' projects, domestic/international cooperative RDI projects and cooperation liaison offices. Relatively fewer cluster managers mentioned use of RO/UNIV or industry facilities (4 replies) and staff mobility (3 replies). Under the "Other" category, two cluster managers said that dual training is conducted by the cluster member university in cooperation with cluster member companies.

Both the interviews with cluster managers and the online survey with RO/UNIVs confirmed that collaborative RDI projects are working models of cooperation in clusters. The prevailing model of cooperation is at which the projects are organised and managed by individual members. There was no cluster manager that would have said that this type of model is unimportant, whereas 7 of them indicated that this model is either important or very important.

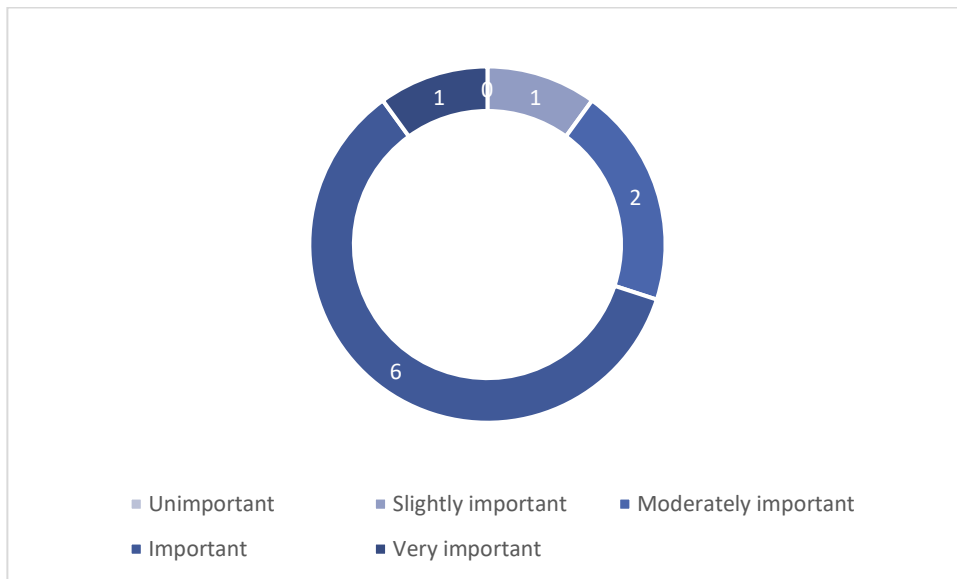


Figure 18 Models of cooperation between firms and RO/UNIV – projects organised and managed by individual members – distribution of replies from cluster managers

Source: own elaboration based on the online survey with research organisations and universities

This is in sharp contrast to the model of cooperation that is organised and managed by the cluster manager. Six cluster managers replied that this model of cooperation is not important in their cluster, whereas two indicated that it is moderately important and further two that it is important. The result is in line how clusters are structured in Hungary. Typically, the cluster management organisation is active in strategic, networking/matchmaking and administrative fields that concern all or most of the cluster members but are not actively involved in single projects, definitely not as managers or organisers of such projects. However, the cluster management usually has a very active role in facilitating the birth of projects through direct and indirect means but leaves the management of articulated projects to the ones that implement them. Monitoring and assistance may nevertheless be provided frequently by cluster managers to running projects.

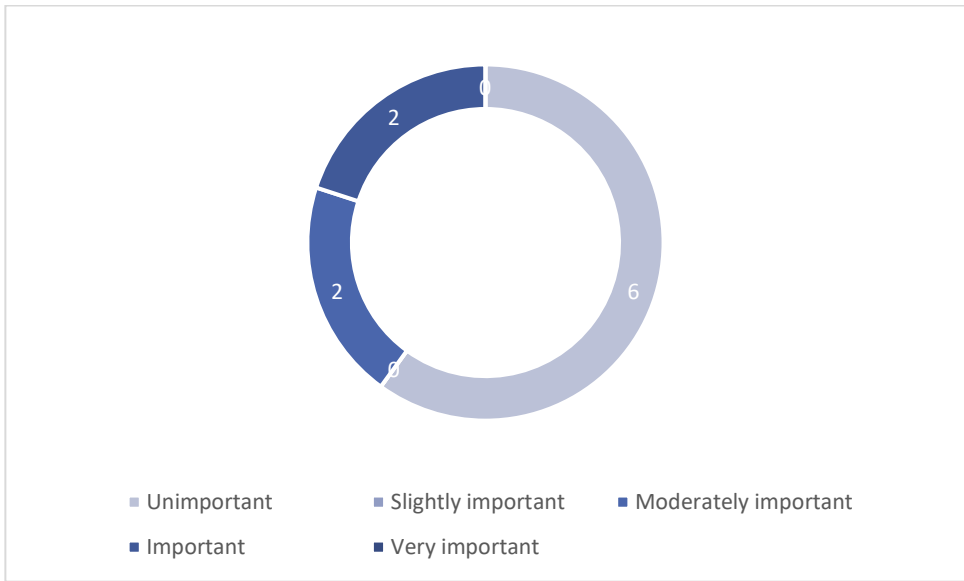


Figure 19 Models of cooperation between firms and RO/UNIV – projects organised and managed by the cluster manager – distribution of replies from cluster managers

Source: own elaboration based on the online survey with research organisations and universities

In the online survey seven predefined activities have been offered to respondents from RO/UNIVs to check if they carried them out when cooperating with the cluster organisation and its members. On average, respondents checked 2.5 activities that they carry out. The dispersion on the number of activities are included in the graph below, which shows that 7 from 11 respondents perform at best two types of activities, but there was also one respondent that checked all seven predefined activities. It is important to note that respondents from RO/UNIVs filled in the survey with regard to their own capacities, probably number of activities would be higher if responses concerned the capacities of the organisations that they work for.

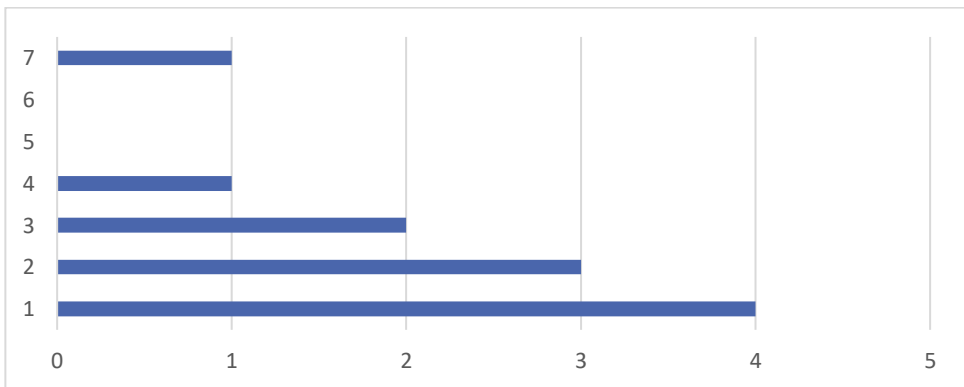


Figure 20 Number of tasks/activities that RO/UNIV carry out when cooperating with the cluster organization and its members

Axis X: number of mentions, Axis Y: number of activities

Source: own elaboration based on the online survey with research organisations and universities

The most frequent activity is conducting trainings ticked by 7 from the 11 respondents, also more than half of the respondents were active in writing applications/project proposals. It may come somewhat unexpected that less than half of the respondents chose that they conducted research with cluster members. This might be in part again down to the fact that respondents answered questions with regard to their own capacities.

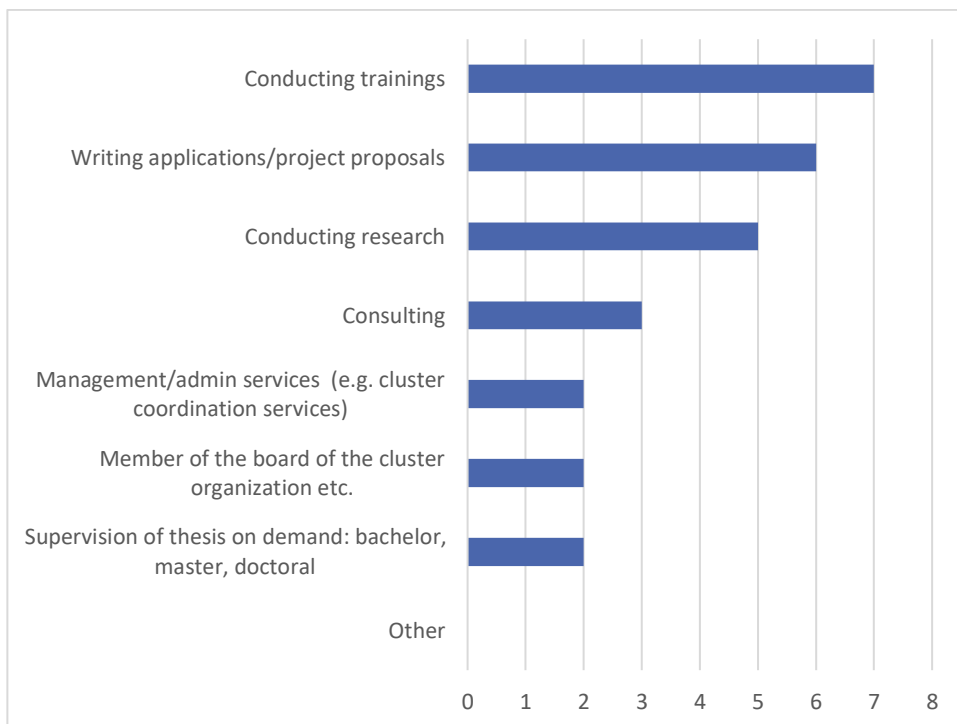


Figure 21 Type of tasks/activities that RO/UNIV carry out when cooperating with the cluster organization and its members – number of replies from RO/UNIV

Source: own elaboration based on the online survey with research organisations and universities

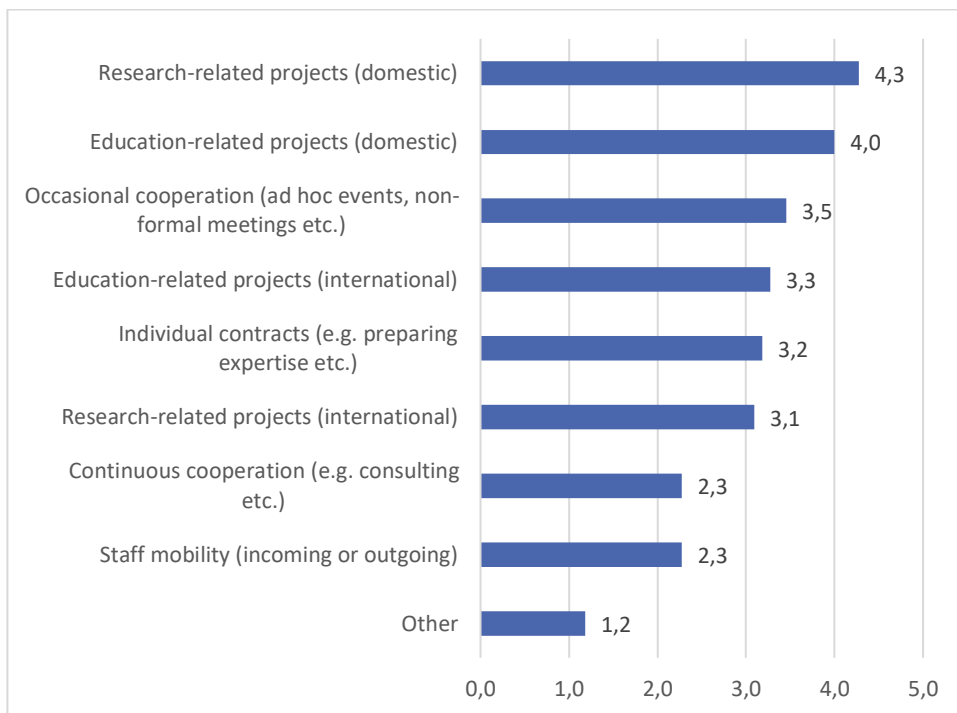


Figure 22 Relevance of listed forms in the cooperation with the cluster organization – replies from RO/UNIV

0 – did not reply, 1 – not relevant at all, 2 – slightly relevant, 3 – moderately relevant, 4 – very relevant, 5- extremely relevant

Source: own elaboration based on the online survey with research organisations and universities

With regard to the listed form of cooperation with the cluster, RO/UNIV respondents ranked domestic research related projects to the highest relevance, followed by domestic education related projects. On average relatively high score was given to the occasional cooperation, international education related projects, individual contracts and international research related projects. Continuous cooperation and staff mobility were ranked as slightly important on average. It can be seen that domestic forms of cooperation regardless whether it is focused on research or education rank higher than corresponding international forms. Moreover, occasional forms of cooperation are more relevant than continuous cooperation. Dispersion of replies among the respondents provide a better understanding to the results. These are shown in the graph below.

Results show clear trends with regard to domestic education and research related projects since their ranking has the smallest variance among respondents meaning that these are not only highly relevant for RO/UNIV respondents but also that most of them have shared their high relevance. All the other replies show relatively high divergence and it is the international

research related projects at which respondents have the highest differences in views. This may show that it is not only on the clusters' side that some have a clear orientation to international projects whereas some are mostly concerned with domestic projects but a comparable pattern gets formed on the RO/UNIV side.

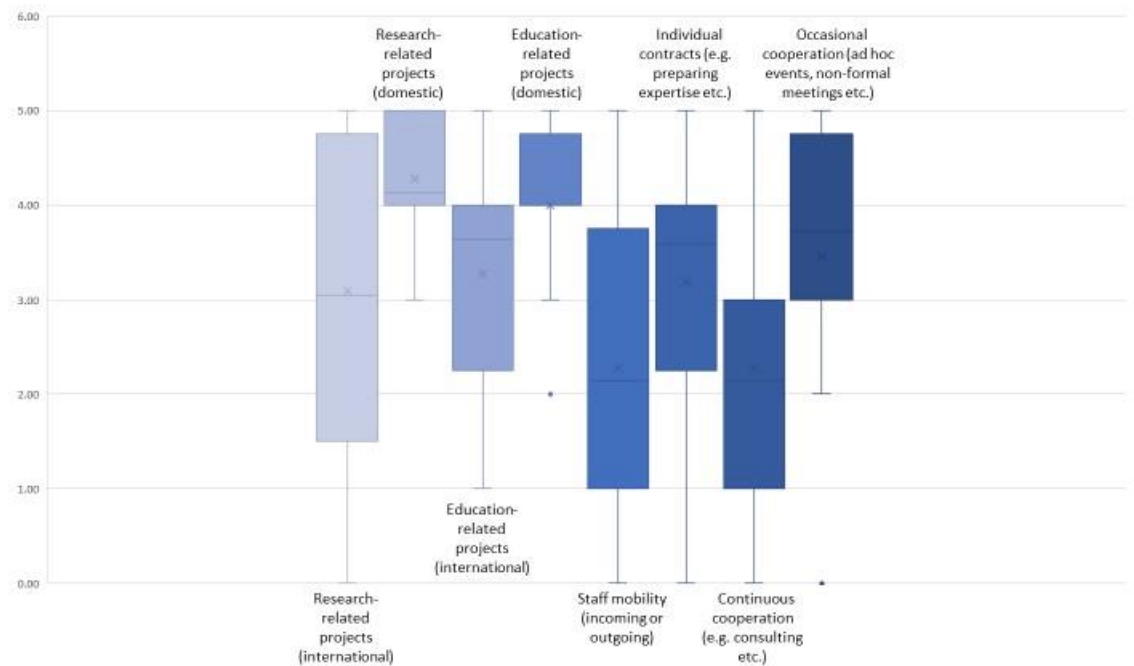


Figure 23 Relevance of listed forms in the cooperation with the cluster organization – dispersion of replies from RO/UNIV

0 – did not reply, 1 – not relevant at all, 2 – slightly relevant, 3 – moderately relevant, 4 – very relevant, 5- extremely relevant

Source: own elaboration based on the online survey with research organisations and universities

RO/UNIV respondents dedicate 72% of their time on average to research and/or education activities with regard to their cooperation with clusters – on the one hand this looks as an evident result. Looking at the average values respondents spend close 50% more time with education-related activities (36%) than with research-related activities (26%). On the other hand, it may be somewhat unexpected that time spent on research activities (26%) is just slightly higher than time spent on business related activities (24%). However, it may indicate that these are innovation related activities that are close to market or driven by market and not industrial/applied research type of activities.

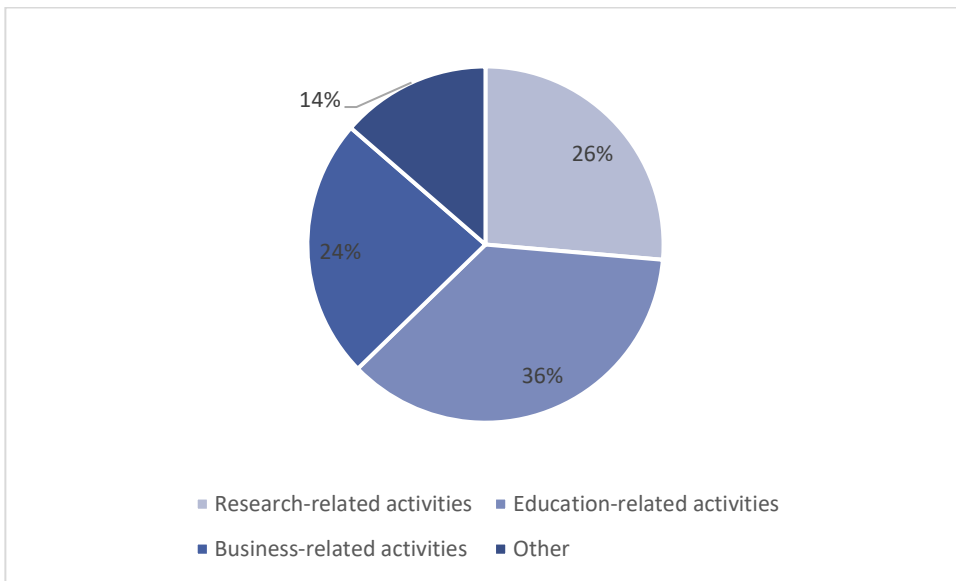


Figure 24 Share of profiles of activities indicating the time each of them occupies with regard to RO/UNIV cooperation with the cluster organization and its members

Source: own elaboration based on the online survey with research organisations and universities

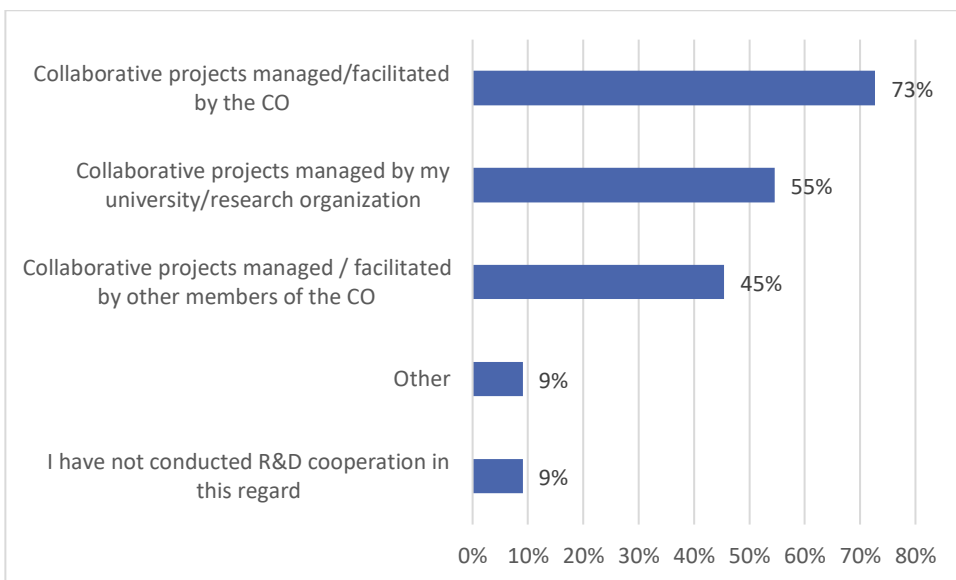


Figure 25 Applied models of R&D cooperation with the cluster organization and its members by RO/UNIV

Source: own elaboration based on the online survey with research organisations and universities

The most popular model of R&D cooperation is the one that is managed and/or facilitated by the cluster organisation – 73% of the respondents marked this option. A lower but still substantial number of respondents (45%) had also such collaborative projects that were managed/facilitated by other members of the cluster. A bit more than half of the respondents (55%) indicated that they have been involved in collaborative projects that have been managed by their universities or research organisations. There is one respondent (9%) that indicated a further type of collaboration in the form of joint webinar, workshop and conference. There was one respondent stating that they had not conducted R&D cooperation.

Factors conditioning B2R/R2B cooperation in cluster organizations

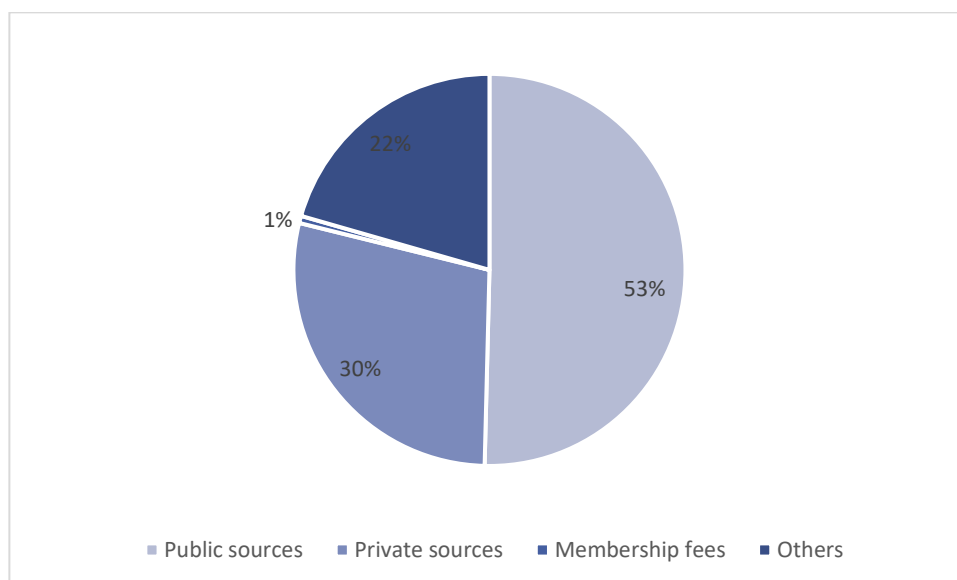


Figure 26 Main financial sources for collaborative R&D&I projects in last three years in average – replies from cluster managers

Source: own elaboration based on the online survey with research organisations and universities

According to cluster managers the main financial resources for collaborative R&D&I projects in last three years were public sources (53%), whereas private sources account for 30% on average. Cluster membership fees do not contribute to RDI projects at all. When summing up the results, 22% accounts for other resources but it is important to note that it comes from two replies, whereas 8 cluster managers considered this option as irrelevant. These replies confirm the general view that in Hungary public financing is needed for the implementation of collaborative projects. The public financing is supplemented by limited private sources. Membership fees in clusters do not provide funding for collaborative projects, this is confirmed by our results. The overwhelming majority of clusters collect membership fees for other purposes like basic operations of the cluster management, events, networking and training eventually but not for collaborative projects.

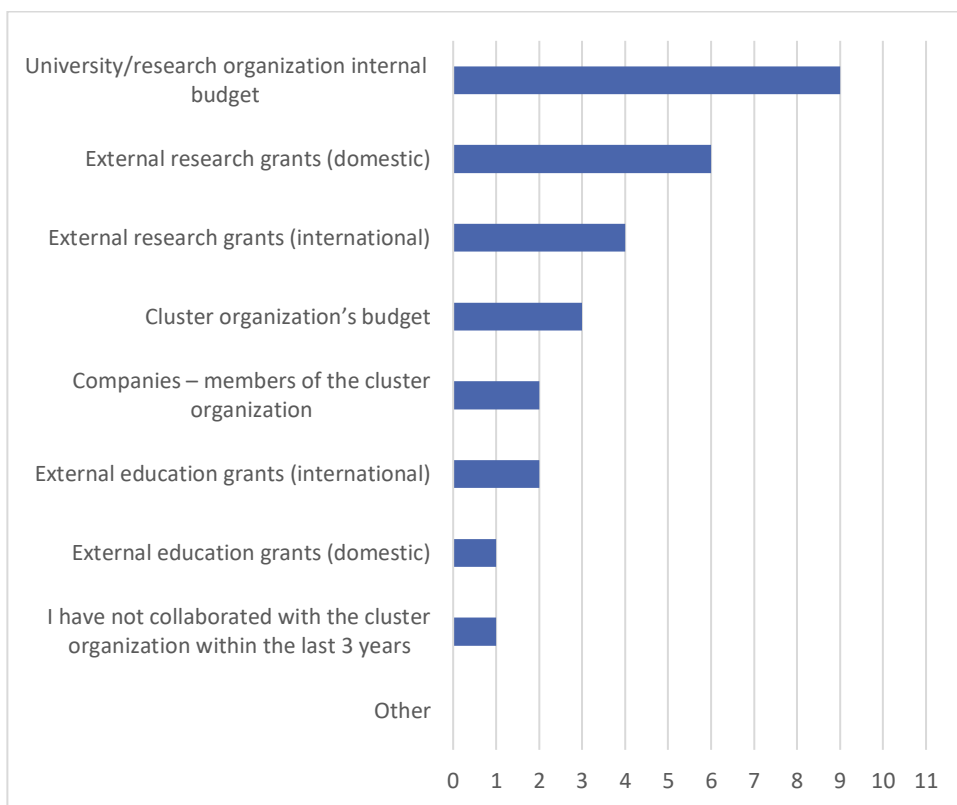


Figure 27 Most important funding sources for RO/UNIV cooperation with the cluster organization and its members in the last 3 years – replies from RO/UNIV

Source: own elaboration based on the online survey with research organisations and universities

With regard to the most important funding sources for their cooperation with the cluster organisation and its members in the last three years, RO/UNIV respondents' most frequent choice was UNIV/RO organisation internal budget (8 replies from 11 respondents). Second most frequent financial source was the domestic external research grants (6 replies from 11 respondents) followed by international external research grants (4 replies). 3 respondents indicated the cluster organisation's budget. Cluster members companies' funding and international external education grants were selected only twice, whereas domestic external education grants were selected only once.

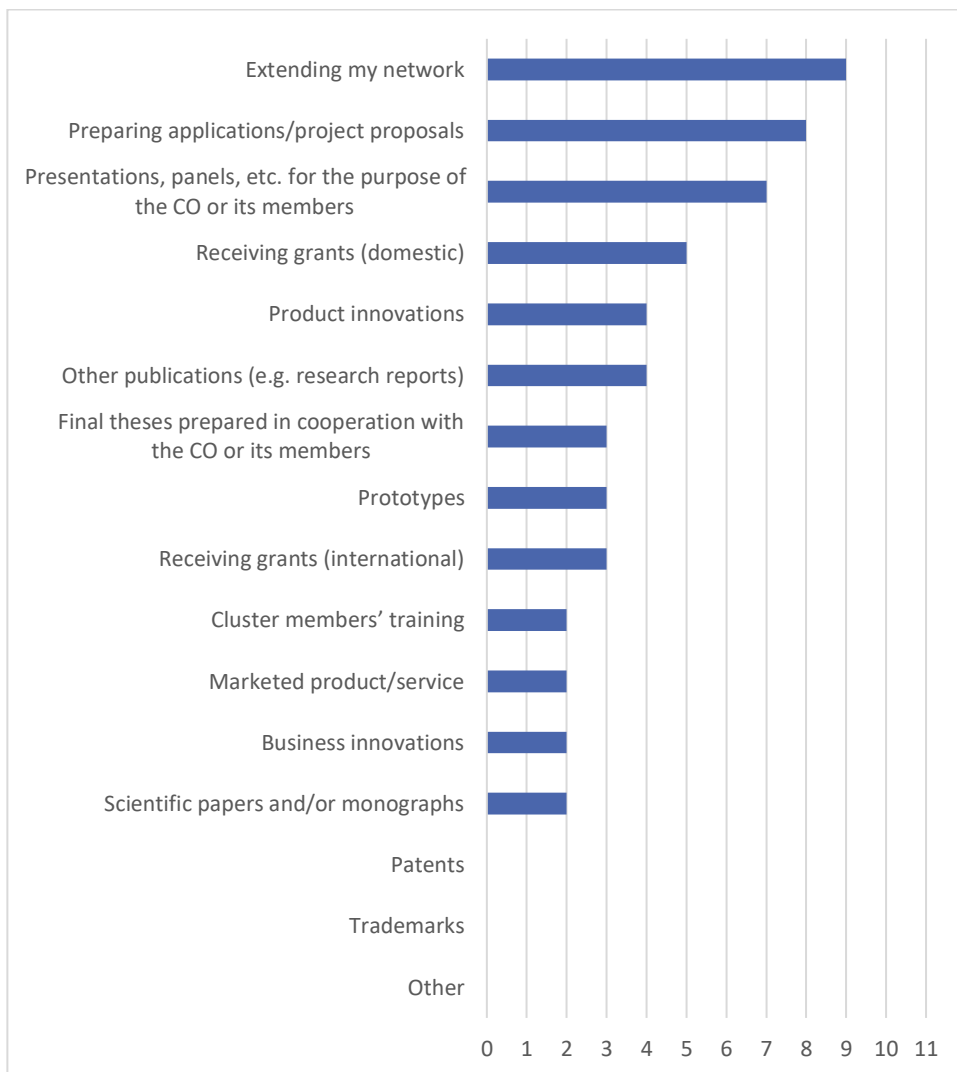


Figure 28 Type of results associated with RO/UNIV cooperation with the cluster organization and its members – replies from RO/UNIV

Source: own elaboration based on the online survey with research organisations and universities

RO/UNIV respondents were asked about the results that can be associated with their cooperation with the cluster organization and its members. The outcome tends to show that the most frequent calls are for “soft” results like extending the network (selected by 9 respondents from 11), preparing applications/project proposals (selected 8 times) and presentations, panels for the purpose of the cluster and its members (selected 7 times) . It may be interesting that neither those results were selected frequently that seem to be the closest to RO/UNIV staff, nor those that are business related. For example, scientific papers were selected only twice, final theses three times, other publication four times. Looking at business-

related results product innovations have been selected four times, prototypes three times, marketed product/service twice.

Challenges and barriers for B2R/R2B cooperation

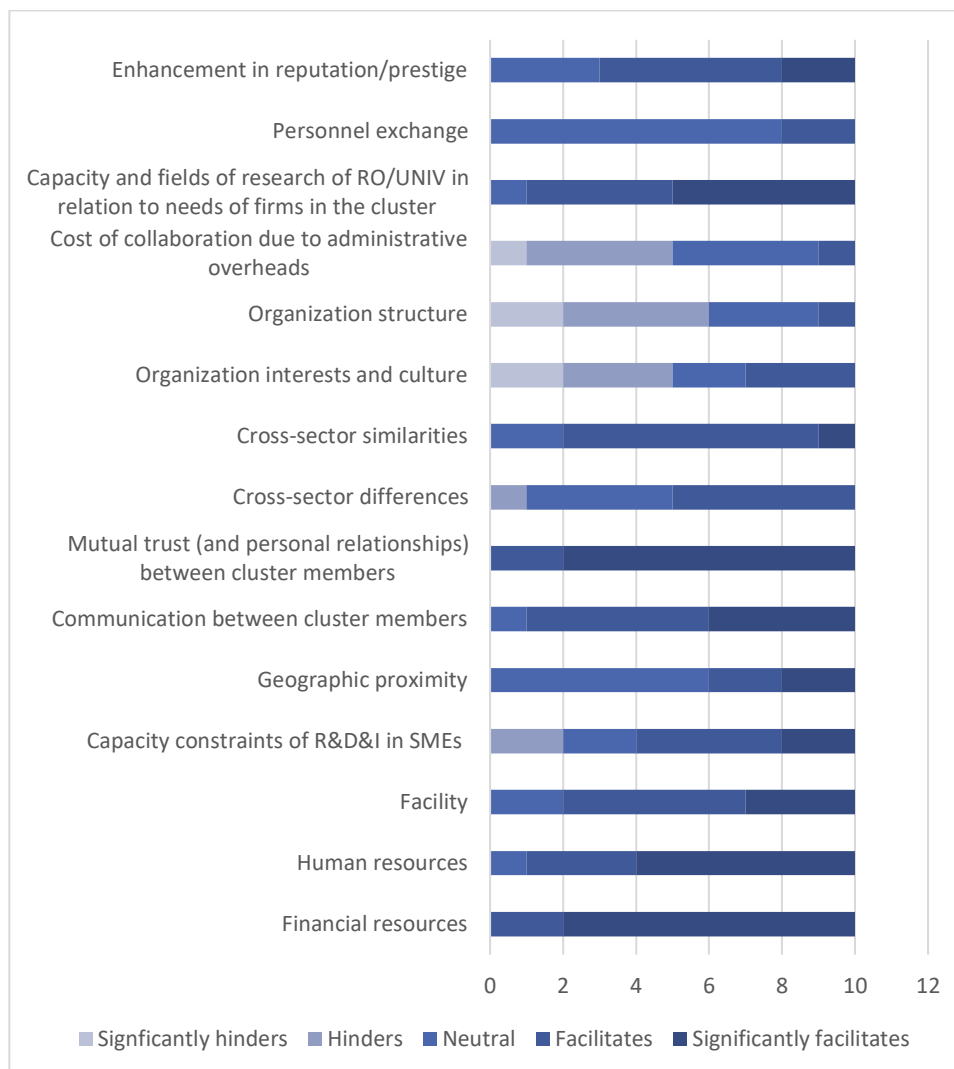


Figure 29 Hindering and facilitating factors of cooperation between business and research institutions in clusters – replies from cluster managers

Source: own elaboration based on the online survey with research organisations and universities

Cluster managers put available financial resources and mutual trust on top of those factors that facilitate cooperation between business and research institution within their cluster. Human resources, communication between cluster members and fitting research capacity and fields of RO/UNIV are seen as strong facilitators too. Available facilities, cross-sector similarities and increase in reputation are somewhat ranked below of the aforementioned factors but still seen facilitating conditions. 8 from the 10 interviewed cluster managers deem the impact of

personnel exchange neutral on cooperation. Beyond that 6 cluster managers think that geographic proximity has a neutral role in facilitating cooperation. The neutral role of geographic proximity is in line with what RO/UNIV respondents answered to similar question. This result seems to be in conflict with cluster literature that considers geographic proximity an important condition of clustering. On the opposite end of the scale, cluster managers see difference in organisation structures, cost of collaboration due to administrative overheads and difference in organisation interest and culture the most relevant hindering factors of cooperation.

The best practices of B2R/R2B cooperation in cluster organizations that can be transferred and implemented in other V4 countries

In this chapter we present the best practices that were offered by the interviewed cluster managers and the RO/UNIV survey respondents.

Title: Living Lab Network

Cluster involved: INNOSKART Digital Cluster

Challenge addressed: Industry 4.0 in the food industry has big potentials in Hungary too, but at the moment opportunities are not exploited.

Way of implementation: The cluster connected its knowledge partners into a living lab network to support digital technology transfer in the food industry. Competences of the living labs complement each other. The network offers the living labs to provide complex assistance to SMEs in the food industry.

Main stakeholders and main beneficiaries: The beneficiaries are the SMEs in the food industry in and beyond the INNOSKART Cluster. The main stakeholders are the Industry 4.0 Technology Centre at Budapest University of Technology, the ELTE IoT Innovation Lab and the Óbuda University, Antal Bejczy Centre for Intelligent Robotics.

Resources needed: No information available.

Timescale: The network was kicked off in autumn 2020.

Evidence of success: At the early stage of the practice it can be considered a success that the UNIV/RO partners teamed up on the initiative of the cluster to form a living lab network.

Cluster relevance of the practice: Members of the Living Lab Network are all members or strategic partner of the INNOSKART Digital Cluster.

Potential for learning or transfer: The underlying idea of bringing together knowledge partners in a specific field inside the cluster could be transferable to other clusters too.

Source: own elaboration based on interviews with cluster managers

Title: Demand driven “needle-type” trainings

Cluster involved: System Science Innovation Cluster

Challenge addressed: SMEs in the cluster and beyond lack skilled IT workforce. In many instances what is needed is a very short but very intense training to would-be or current colleagues in niche IT subjects.

Way of implementation: Needle-type trainings dig deep in a niche subject and train colleagues from cluster SMEs in that. The trainings are intense and short (~1 week duration). Areas in which the niche subjects are defined range from mobile application development; software development methodology, testing, quality control; back-end systems. The trainings are organised by the cluster management company based on the needs of SMEs. The training material is validated by the Faculty of Electrical Engineering and Informatics of the Budapest University of Technology and Economics that is a member of the cluster. Annually 2-4 trainings provided.

Main stakeholders and main beneficiaries: Main beneficiaries are the SMEs in and beyond the cluster. The Budapest University of Technology and Economics (a member of the cluster) takes part in developing, updating and validating the training material

Resources needed: Design, content development and launch had a cost of roughly EUR 100,000, annual running costs are around EUR 15,000 depending on the number trainings. The cluster was successful obtaining grants for the development and launch of the trainings, nevertheless contribution from participating SMEs is requested.

Timescale: 2015 - ongoing

Evidence of success: The cluster is running these trainings for 7 years now due to interest from SMEs.

Cluster relevance of the practice: Cluster member companies needed specialised training for their employees, this need was identified and articulated on cluster meetings. Understanding the demand, the cluster management organisation took on to develop and organise trainings with the involvement of the knowledge partner in the cluster.

Potential for learning or transfer: The way the cluster management organisation reflected on cluster company needs is an important learning point. The type of trainings, the way they are organised may be transferred to other organisations too.

Source: own elaboration based on interviews with cluster managers

Title: Balatonfüred Knowledge Centre of the Budapest University of Technology and Economics

Cluster involved: System Science Innovation Cluster

Challenge addressed: The Balaton Lake area in Hungary is primarily a tourist destination. The seasonality, the touristic focus forces municipalities to find ways to retain young people, to attract companies and investments through boosting further economic sectors. Balatonfüred has been the seat of the System Science Innovation Cluster for many years and the cluster had been active in trying to attract IT companies in the region. Furthermore, the ICT sector is too much concentrated on the capital both with regard to market, workplaces and training.

Way of implementation: Following years of joint work and joint projects main stakeholders of the local ecosystem in Balatonfüred agreed to establish a Knowledge Centre with the participation of the Budapest University of Technology and Economics. The main aims of the project are to provide curricular education, various training programmes adjusted to company needs and offering research services to companies. The Knowledge Centre's newly built infrastructure has the following characteristics: 2000 sqms, two-floor building with 10 education and research halls, 2 auditoriums and 4 seminar rooms, 275 student workplaces, 30 people in research and administration capacity.

Main stakeholders and main beneficiaries: Main beneficiaries are SMEs in the Balatonfüred and wider area, students that would like to engage in IT studies locally. The Knowledge Centre will contribute to maintaining young people in the region and will attract skilled workforce. Balatonfüred municipality has been intensely involved in the project and is a strong endorser of the project.

Resources needed: The Knowledge Centre has been partially funded through an EU co-financed project. Investment costs reached 5.2 million euros, grant volume was EUR 3.3 million euros.

Timescale: Preparatory works, design started from 2015. The Knowledge Centre has opened up in 2021.

Evidence of success: At this stage, the success is materialised in the cooperation of the cluster and the Budapest University of Technology and Economics. This is the first significant training and development centre of this Budapest-based University in the countryside. A further success is that they were able to convince concerned ministries and implementing agencies on the relevance of the project.

Cluster relevance of the practice: The cluster has been the engine of the whole concept from the early start on. It had been working with local IT companies, the local municipality and the University of Technology for many years. Without the cluster's ambitions, organising efforts this project would have not been realised

Potential for learning or transfer: The practice is an example of long-term joint work of stakeholders of a local ecosystem. The cluster has a central role in the local economic ecosystem. As a result of many years of cooperation and joint projects the stakeholders have been able to design and implement a large market-driven education project.

Source: own elaboration based on interviews with cluster managers

Title: IT HUB Pécs

Cluster involved: Information Management Innovation Cluster

Challenge addressed: Town of Pécs in south Hungary struggles with keeping young graduates, the local ecosystem would be like to more attractive for inviting new enterprises and retaining current ones. There is a community of ICT companies and organisations but they did not have an appropriate permanent physical space for gatherings, events, meetings.

Way of implementation: The aim of the initiative is to harmonise the activities of ICT companies and institutions that operate in the town Pécs through a shared physical hub. The physical infrastructure is a 280 sqm large co-working space in an office building. The hub helps new established enterprises with office space, moreover the hub can be used for events, workshops, training etc. The hub can serve as a showroom for state-of-the-art technologies. Founders hope that the shared space will lead to joint innovation and joint projects. The hub could fight against brain-drain by keeping young graduates in the city.

Main stakeholders and main beneficiaries: Founding members are the Information Management Innovation Cluster, the local government of Pécs, the University of Pécs, the county chamber of commerce. Main beneficiaries are ICT enterprises and students from the town.

Resources needed: The hub relies on the support of the local government, the University of Pécs and chamber of commerce. It works in a not-for-profit model. The HUB builds on financial support from stakeholders and companies. Annual fees range from EUR 150 to EUR 3000.

Timescale: IT HUB Pécs opened in October 2020

Evidence of success: 40 companies participated in the design and launch of the hub beyond the above listed stakeholders. Since the opening the IT Hub has quickly become a meeting place for entrepreneurs, students, lecturers, the hub offers continuously various types of programmes.

Cluster relevance of the practice: The cluster management organisation is founding member to the HUB and has been active in concepting, designing and implementing the hub from the start on and was so a key facilitator and intermediary among stakeholders.

Potential for learning or transfer: The practice is a showcase how the key stakeholders of a local innovation eco-system can work together to establish a hub for entrepreneurs, students and researchers.

Source: own elaboration based on interviews with cluster managers

Title: InnoWood Interreg Austria-Hungary project

Cluster involved: Pannon Wood- and Furniture Industry Cluster

Challenge addressed: The cross-border regions of Western Transdanubia in Hungary and Styria and Burgenland in Austria have robust wood and furniture industries. However, when it comes to R&D and innovation, the two countries have a rather weak track record for cooperation. Wood industry lags behind other leading edge sectors like automotive in applying innovative technology solutions. SMEs in the wood and related sectors need assistance to exploit their innovation potentials and to market their products.

Way of implementation: An Austrian-Hungarian consortium of four members teamed up for a cross-border Interreg project. Project members were two clusters (Pannon Wood- and Furniture Industry Cluster from Hungary and the Wood Cluster Styria from Austria) and two research and education institutes (IITF – The Institute for Innovation and Trend Research in Graz and the Burgenland College). The project provided expert assistance to SMEs in the furniture industry to develop financial and marketing plans. The project included innovation camps for young people and entrepreneurs and study visits. In addition to that an online marketplace has been also established (innowoodest.eu).

Main stakeholders and main beneficiaries: The main beneficiaries were small enterprises that received various type of innovation consultancy in the project. Beyond project partner the University of Sopron was also a contributor to the project.

Resources needed: The total project cost was roughly EUR 1 million from which EUR 840,000 was ERDF funding.

Timescale: The project lasted from May 2017 till October 2019.

Evidence of success: The project ran with large interest from students and SMEs from both side of the country. A lasting result of the project is the online marketplace.

Cluster relevance of the practice: It was two clusters on each of the Austria-Hungary border that brought together the project. The project functioned as inter-cluster collaboration and involved actively research and education institutions.

Potential for learning or transfer: The concept of the two clusters have elaborated for working together provides good evidence. The thematic content of the project can be worth of considering for other similar initiatives.

Source: own elaboration based on interviews with cluster managers

Title: Start me Up! Idea contest and mentor programme

Cluster involved: North Hungarian IT Cluster

Challenge addressed: Promising business ideas are often lost due to lack of needed skills of idea owners. These skills include business planning, presentational skills, financial management, marketing, etc. In addition to that, funding is a crucial factor in developing ideas.

Way of implementation: Key local stakeholders in North-Hungary backed by a large key startup mentoring programme decided to launch a mentor programme and idea contest to local students and entrepreneurs. The programme runs on annual base. Mentors are involved that provide participants expert assistance. At the end of the programme participants pitch their idea to a jury, best ideas are rewarded.

Main stakeholders and main beneficiaries: Main stakeholders were the University of Miskolc, Bay Zoltán Nonprofit Ltd. for Applied Research, BNL Start Incubator, and the INPUT Programme. University of Miskolc and BNL Start Incubator are central players in the North-Hungary innovation ecosystem. Main beneficiaries are would-be entrepreneurs, students from the North-Hungary area.

Resources needed: No information available.

Timescale: The programme runs since 2018.

Evidence of success: The programme attracts a large number students and entrepreneurs each year.

Cluster relevance of the practice: The North Hungarian IT Cluster has a central role in organising the event, they have excellent contacts the BNL Start Incubator. University of Miskolc is a member of the cluster.

Potential for learning or transfer: Structure of the programme is worth examining. The way the local stakeholders work together is also a good practice.

Source: own elaboration based on interviews with cluster managers

Title: Dedicated call innovation projects of cooperating accredited cluster members (EDOP-1.3.1/B)

Cluster involved: Accredited innovation clusters in Hungary

Challenge addressed: Share of such innovation projects, in which more than one companies and/or research organisations participate were modest in Hungary. The call tried to raise the interest for collaborative projects among business actors.

Way of implementation: An open call for proposals was launched by the Managing Authority of Economic Development Operational Programmes to provide support to the joint technology innovation of such companies that already dispose of innovative existing, marketable products/services/technologies and they are ready to further develop these. Cooperation of cluster member companies was an entry criterion. Beneficiaries could only be accredited cluster member companies. The call offered a maximum of 55% support ratio to projects. Grant volume was EUR 0.05 million – 1.7 million. It was possible to subcontract research organisation or other type of knowledge partners. Eligible costs were R&D staff costs, purchase of know-how and services, investment in infrastructure and machinery and marketing

Main stakeholders and main beneficiaries: The main beneficiaries were accredited innovation cluster member companies.

Resources needed: The call had a total financial frame of roughly EUR 95 million

Timescale: 2008-2013

Evidence of success: The call was published in 5 rounds. Altogether around 150 joint innovation project received funding.

Cluster relevance of the practice: The call was specifically targeting accredited innovation cluster companies.

Potential for learning or transfer: Policy makers decided to target this joint innovation call to accredited innovation cluster members only. It shows their conviction that these companies offer a higher than average openness to joint innovation projects.

Source: own elaboration based on interviews with cluster managers

Conclusions and recommendations

During the interviews cluster managers put forward the following recommendations to improve the cluster policy:

- *Reliable cluster policy aiming at stability. Creating a uniform visibility for Hungarian clusters. National-level cluster marketing abroad.*
- *The public assistance system should return to the practices of "dedicated calls for clusters" that were available between 2008-2012. Now, members of accredited clusters receive just extra points in calls but that is not adequate. Moreover, in recent years there were hardly any calls at all. No support for cluster management either. Clusters were requested to make strategies but no support programmes have been built on these strategies. Because of these the cluster turned towards education. But also, with regard to education stable public assistance for operations would be needed. Role of education will increase, importance of geographic proximity will rise because the workforce that is "generated" locally will be utilised locally. Distant firms of the cluster may leave the cluster in the long run and firms from the neighbourhood will join.*
- *Compulsory involvement of clusters in innovation projects, reducing the administration burden on clusters, public support to the cluster management organisation for stable operations*
- *Support to intercluster cooperation. This helps to form bigger clusters. Support to cluster-to-cluster networking.*
- *Clusters have a documented track record that the government knows. The clusters' performance is good. Based on the track record clusters could be supported. Some limited amount of support should be available for the cluster management operation. Exclusive advantages for clusters that are accredited for a long time. Support to enter international markets.*
- *Those activities shall be supported that are new to clusters. For example: participation on fairs - only those ones that the applying cluster has not visited yet. Super clusters seem to be a good idea. Collaboration platforms would be useful. Simplification of administration. Each cluster may have different needs for support. Larger support to internationally known clusters. Stronger acknowledgement of international results*
- *There should be a national cluster policy. Consensus among actors would be needed. Recognition and acknowledgement of cooperation by policy makers. There's been a huge disruption in the cluster policy. It has to be continued close from scratch. Learning and transferring international good practices, international consultation with EU countries having best practices (Germany - multi-level system, France, Denmark - knowledge sharing)*

- *Superclusters would be useful, transforming and updating the accreditation system, more financial support*
- *Support to top clusters, facilitation of cluster collaboration platforms - strengthening of regional clusters, enhancing international visibility, gathering of actors of any sectorial supply chain, involving top clusters in decision making. For all these and because of the increased number of cooperating actors, it is necessary to support cluster management organisations.*
 - *Launching cluster trainings*
 - *Securing participation and involvement in vocational and dual trainings, facilitation of clusters with regard to partnerships in knowledge centres*
 - *Strengthening the role of educational institutes, universities in clusters: development of relevant research and education activity based on research results and the results of the clusters, youth education, aggregator role.*
- *International support could be available for clusters and cluster members*

RO/UNIV representatives provided the following replies on how to improve cooperation between universities/research organisations and business in Hungary:

- *Increasing the openness of the business sphere. Reduction of university administration issues (complicated contracting procedure, cumbersome invoicing procedure for offered services)*
- *Supporting mindset, such management that foresees future to lead the organisations*
- *Openness*
- *Demonstrating the success of such cooperation through some good (in terms of ROI) examples. But I am afraid that this does not work from "easy money". The real good example is when a company pays for a university contract overwhelmingly from its own sources because then it has real interest in success.*
- *The university must have direct financial interest to serve local companies. Only money works, nothing else.*
- *More dialogue, R&D calls that can be submitted jointly*
- *Cooperation could be increased significantly through joint, consortial R&D projects. In order to secure this, more calls for proposals would be needed.*

The conducted analyses showed that most important factors are trustbuilding, networking, information flow and opportunities for project development. Importantly, these shall include relevant stakeholders from business and research but also from governmental sector. These factors are functionalities that well-functioning clusters continuously provide. However, these

functionalities may be provided by other type of „organisations”, too - let them be called hubs, platforms, eventually chambers of commerce, association, alliances, too. Well structured, well governed, well managed clusters may have advantages over other type of business support forms. One of the key features is that they directly connect business and research, whereas chambers of commerce, associations typically have a disadvantage because they primarily represent business. But as long as they are able to bring in knowledge through any means they can manage well, too. Hubs, platforms may include business and research alike. So – in the eyes of policy makers - other collaborative forms that bring together stakeholders from the triple helix and provide good functionalities can be considered equivalent to clusters. This comes through in the current strategic papers of Hungary that largely neglect clusters as relevant tools for knowledge bridging and knowledge transfer.

Clusters are well-positioned to provide the above mentioned functionalities but it does not come by definition that clusters are always good in providing these. Need for public funding for RDI projects is justified by numerous analysis and programmes run at local, regional, national and macroregional level. Policies support RDI projects to a great extent. By experience collaborative projects bring along greater opportunities but also bigger risks. Network and trust help reduce these risks. But whether clusters “deserve” particular attention of policy makers so that part of funds are diverted to or channelled through clusters depend on their performance. The tens of non-functioning and terminated clusters are mementos for that in Hungary and probably one of the reasons why clusters are not in the focal point of RDI policies.

Another reason may be the size of clusters. The average number of members of an accredited cluster in Hungary is 38. From a Central-European perspective but even more from a European perspective these are micro-clusters with very limited effect (lack of critical mass). Micro-clusters may be very good in strong connections of their members but that is outweighed by the limitation of opportunities. Sizes would need to grow so that more companies are involved more opportunities can be identified. If managed well size brings along exponential number of opportunities. Clearly, if size grows attention must be paid to informal links among members, group dynamics. For a visible impact, clusters sizes should grow significantly. Some of the cluster managers’ recommendations touched this issue (superclusters). Even though most clusters in Hungary have grown in the past three years that is far from enough, membership of clusters would need to rise to the hundreds instead of the tens.

Literature

Bacsa, L. Bodzay, B.: TIP Working Party Knowledge Triangle Project (2015-16). Case study: Hungary “KT Enabling policy”, OECD

Boda, Zs., Magyar Tudományos Akadémia: EÖTVÖS 2020+ PROGRAM, Fehér Könyv az MTA Kiváló Kutatóhelyeiről és az Innovációról. 2020

European Commission, DG Internal Market, Industry, Entrepreneurship and SMEs: A vision for the European industry 2030. Final report of the Industry 2030 high level industrial round table 2019

European Expert Group on Clusters – Recommendation Report 26/02/2021

Government of Hungary: Economic Development and Innovation Operational Programme Plus Draft Version 1.4. 2021

Government of Hungary: Smart Specialisation Strategy (S3) 2021-2027. July 2021

Holle, A.: A tudományos és a vállalati szféra közti tudásáramlás. INFOJEGYZET, Országgyűlés Hivatala, 2021/21. 2021.04.22.

NRDI Office (2019), “Centres for Higher Education and Industrial Cooperation, Hungary: Case study contribution to the OECD TIP Knowledge Transfer and Policies project”, National Research, Development and Innovation Office

OECD: University-Industry Collaboration. New Evidence and Policy Options. 2019

Pavelkova, D., Bendo, Z., Frankowska, M., Haviernikova, K., Bruszkova, P., Bednar, P., Knapkova A., Danko, L., Sopoligova, M., Myszak, J. M., Somkuti, M.: Towards Smart Cluster Policies in V4 Countries. Tomas Bata University, Faculty of Management and Economics, 2019

Schneider, K., Ziegler, O., Meier zu Köcker, G.: Strengthening the Capacities of Clusters in the Danube Region (White Paper), December 2019

Working Group “Clusters and Regional Development” (Priority Area 8 – Competitiveness of Enterprises) (2019). Initiative: The Strategy for Strengthening the Role of the Clusters in the Danube Region

Webportals:

<https://www.cluster-analysis.org/>

<https://www.clustercollaboration.eu/>

<https://clustercollaboration.eu/community-news/strategy-strengthening-clusters-danube-region>

https://ec.europa.eu/info/research-and-innovation/statistics/performance-indicators/european-innovation-scoreboard_en

<http://klaszterfejlesztés.hu/>