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The Reluctance of the Local Public Administration to Participate in the Triple Helix

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Abstract:

Public administration collaboration within the Triple Helix is critical to drive innovation and research. According to European Union support for joint research and innovation agenda through smart specialization projects, the strategy on cooperation within different regions is crucial. In the paper we examine the willingness for cooperation of different levels of government in the Triple Helix in research and innovation in Alpine region. We employed a quantitative approach by surveying public officials across different levels of government in seven countries that make up the Alpine region community. The empirical results suggest that public administration's willingness to collaborate varies depending on which stakeholder they are associated with. The differences in willingness to collaborate also vary depending on the level of collaboration. The research findings have shown that the biggest obstacles to better collaboration in the Triple Helix are at the local level, despite various efforts in supporting collaboration by the EU.

Keywords:
Alpine region, good governance, local government, research and innovation, transnational cooperation

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1. Introduction

Governance encompasses the entire process of preparing, transmitting and implementing decisions (Pierre & Peters, 2020). If public administration follows the rules of good governance, then public policy decisions should be made transparently, openly and with the cooperation with different stakeholders. It is usually expected that a network is built among policy-makers, businesses and civil society, cooperation known as Triple Helix (Keping, 2017; Kooiman, 2003). Specially in the field of innovation the need for cooperation was researched already few decades in the past. The latest research did not change much, since the synergy among all the mentioned actors is important for better innovation and development (Jiménez et al., 2021; Danson & Todeva, 2016). The strength of interactions between the Triple Helix depends on who is the driving force behind the collaboration. If a strong state drives the interaction, the links will be stronger and more integrated. This illustrates that all participants in the Triple Helix are on an equal footing and that no one should be the driving force (Etzkowitz, 2002). Moreover, the economy of scale facilitates collaboration in the Triple Helix, extending beyond national boundaries to encompass cross-border, transnational, or international levels. The European Union has made great efforts to support territorial cooperation. The main objective of supporting territorial cooperation is to promote spatial coherence, which is much greater than at the level of cross-border or national cooperation (e.g. Agiamoh, 2021; Rudolf & Kovač, 2023; Rijavec et al., 2021). According to Proniewski and Jankowska-Ambroziak (2019), the most important factors for successful territorial cooperation are long-term cooperation, a small number of countries within the cooperation and in some cases a common culture is also important. Medeiros (2020) explored the concept of transnational territories for policy implementation, through which territorial cooperation can pursue common development and bring multiple benefits. Villanueva et al. (2022) pointed out that networks and transnational cooperation require stability and reliability for better results through the interaction of governance structures with certain elements such as relational structure, relational framework, shared commitment, etc. Mascarenhas et al. (2020) found in their study that Triple Helix networks mostly work with public funding, regardless of the partners and needs. The role of EU funding for territorial cooperation is therefore an important motivation for territories and stakeholders to work together to reap the benefits of transnational and Triple Helix cooperation.

In our research we wanted to investigate the willingness of public administration to collaborate on research and innovation policy decisions at different levels of government and between different stakeholders in the Alpine region. The purpose of the study was twofold, as we wanted to show (i) the willingness of public administration to collaborate at different levels of government and (ii) the willingness of public administration to collaborate with other stakeholders in the Triple Helix. The study will complement current research, as the assessment of public administration (PA) willingness at different levels is rarely discussed in other research. In line with the theoretical foundations further explained in literature review, our article focuses on the

following research question:

Are there differences in the willingness of public administration to collaborate in the Triple Helix with businesses, PA, and universities and research institutions, depending on the level of collaboration?

Accordingly, the following hypothesis is tested: the willingness of public administration to cooperate with businesses, other public administration organisations, and universities and research institutions varies according to the level of collaboration., namely:

- city;
- local level;
- regional level;
- national level and;
- transnational level.

To the existing literature, we try to fill the gap and contribute to explaining the differences of public administration willingness to cooperate in the Alpine region according to its level. The analysis should help to make transnational and Triple Helix integration more successful. The paper is structured as follows: After the introduction, we present a literature review on the need for cooperation in Triple Helix in the field of research and innovation (R&I) as a background for our research. After that the methodological approach, including research design, data collection, and data analysis, is presented. The empirical results follow and the article concludes with the relevant recommendations for policy makers with the aim of improving Triple Helix collaboration in the Alpine region, and beyond.

2. Literature review

As mentioned in the introduction, cooperation in the field of Research and Innovation (R&I) is a key agenda of several EU support schemes (i.e., Horizon Europe and Structural and Investment Funds). Simultaneously, these schemes are prepared with the assumption of the concept of the Triple Helix, which involves cooperation between universities, academia, research, businesses, and governments at different levels. In the previous financial framework (2014-2020), cohesion policy focused on R&I through the preparation of Smart Specialisation Strategies (S3) by each country (Corpakis, 2019). The Triple Helix pattern was commonly used in this agenda, resulting in several good practices of cooperation. Analysing good practices in different countries showed that the benefits of knowledge co-creation in innovation initiatives outweigh the coordination costs (Jukić, et al., 2019; Kreiling & Paunov, 2021). However, the implementation of cooperation typically centres on small local communities and seldom extends beyond regional cooperation. We attempted to examine this phenomenon in our research, and the results confirmed this pattern.

Similarly, research by Kreiling and Paunov (2021) showed that knowledge co-creation focusing on national or local priorities has a better chance for success. Nevertheless, they also emphasized the importance of fostering international cooperation. In stakeholder theory, most concerns revolve around measuring the power and influence of each stakeholder. In practice, this often fails to provide useful recommendations for actions needed through the cooperation of different stakeholders. Different studies have shown successful stories of cooperation where power and influence are not the most important factors. Instead, these studies demonstrate that when the roles of stakeholders are equal due to their synergies, the results are better (Etzkowitz, 2002; Shikhli et al., 2024). Several good practices of Triple Helix cooperation in innovation have shown that it boosts innovation in the region (see Todeva, 2019), making it crucial to address the willingness for better development.

Todeva and Ketikidis (2017) emphasize another concern that can influence the willingness of public administration to cooperate within the Triple Helix, which is administrative capacity and its changing role. The changing role of public administration as a stakeholder in the field of innovation development has been identified as a possible concern in other research as well (McCann & Ortega-Argilés, 2013; Kroll, 2015; Kóňa et al., 2022). Influence of administrative capacity on local government performance and competence on innovation was confirmed in study of Erwin et al. (2022). The lack of administrative capacity within public administration, especially in small local governments, can hinder the development of those regions and increase disparities between urban centres and small local communities (Petrović et al., 2018). In such cases, Triple Helix cooperation becomes difficult to obtain, resulting in a lower willingness to cooperate. Research in specific fields has even shown that the main initiative must be driven by businesses and academia, and government strategic plans do not play an evolving role unless support schemes are included (Yanhong & Bohan, 2023; Škarica, 2020). Our research partly confirms this, as the main obstacles are derived from the perceived differences in roles in R&I development among different stakeholders. According to our results the main obstacle connected to willingness to cooperate is connected to understanding the role of PA as an important stakeholder of inducing innovation, not just follower or supporter of other stakeholders in triple helix. In this sense willingness to cooperate is assumed as active cooperation when PA is addressed or invited or PA is an initiator of cooperation.

In summary, cooperation within the Triple Helix framework brings several benefits and improvements in the field of innovation. Adding territorial cooperation to the mix would yield even better results. Recent studies (Jiménez et al., 2021; Mascarenhas et al., 2020) highlight the importance of society's engagement in policy-making, particularly in innovation using the Triple Helix model, where the role of public administration (PA) is significant. PA plays a crucial role in this model by acting as a public entrepreneur, venture capitalist, and regulator (Etzkowitz, 2002), providing incentives for collaboration and pressing academic institutions to contribute more directly to wealth creation (Etzkowitz & Leydesdorff, 1995). On the other hand, the

willingness to engage in knowledge co-creation should be considered when the level of government plays a vital role in cooperation. It's worth stressing that in most research, the role of the government is seen as financial support for initiatives and, in rare cases, as a preparatory framework for supportive regulation (i.e. Skarzauskiene et al., 2023; Tiossi & Rodrigues, 2023). This perception can hinder the willingness of public administration, as our research has also shown.

The topic of Triple Helix collaboration is of great importance as it directly addresses the challenges of fostering innovation through collaboration between academia, industry and government stakeholders. While much of the previous research emphasises the benefits of such collaboration, this study offers a unique perspective by focusing on the critical but often overlooked role of public administration (PA) in fostering innovation, especially at different levels of government. It contributes to the global discussion by emphasising that the PA should no longer be seen only as a financial supporter or regulatory facilitator, but as an active initiator and equal partner in innovation agendas. Furthermore, the study emphasises the need to address inequalities in administrative capacity that hinder effective collaboration and exacerbate regional inequalities. By advocating for stronger territorial cooperation and redefining the role of PAs, this study provides actionable insights to improve Triple Helix collaboration and strengthen innovation ecosystems worldwide.

3. Methodological approach

3.1. Research design

The paper employs a quantitative approach, utilising an online survey and examining several sources related to the topic under discussion. The online survey was conducted among PA representatives at different levels of government in all seven countries of the Alpine region to assess the willingness of the public administration to cooperate with different stakeholders at different levels of cooperation. The survey methodology was designed and developed by 11 international project partners within the Interreg A-RING project (2021). The aim of the A-RING project was to identify synergetic levers and create a basis for effective and sustainable collaboration between business, public administration and academia at various levels in order to develop joint R&I strategies for the Alpine regions.[3] The study on the willingness of the public administration to collaborate with different stakeholders in the process of good governance was conducted between March and October 2020. To investigate the research question raised in the introduction, an online survey was used as the main data collection technique. To further elaborate on the findings, we used data and information collected during various events, especially national workshops with experts and other

[3] More information on the A-RING project is available at https://www.alpine-space.eu/project/a-ring/.

stakeholders of the Triple Helix and observers of the said project. Seven national workshops, combining face-to-face and virtual meetings, were held between March and May 2020 in each of the seven partner countries of the A-RING project and included stakeholders from academia, public administration, interested companies and observers. The main objectives of the workshops were (i) the identification of key topics for smart specialisation, synergies and barriers between the private sector, academia and public administration; (ii) the development of a common R&I agenda focusing on the characteristics and potential of the Alpine Space (iii) the establishment of the "Alpine Policy Lab" to develop and test a synergetic and complementary public sector approach to selected R&I topics; and (iv) the activation of the "Alpine Seed Lab" to strengthen joint cooperation between the academic sector and enterprises (especially SMEs) on topics of strategic importance for the Alpine Space.

3.2. Data collection

Each of the A-RING partners identified all the public administration organisations in R&I space in their respective region on three different levels (national, regional, local). 1840 different organisations in the Alpine region were identified by 11 project partners. Given the potential for arbitrary selection of organisations, the selection process was reviewed by academic experts from the fields of economics, organisation, policy and law, as well as recommendations from practitioners, i.e. representatives working in the R&I sector at different levels of public administration, and entrepreneurs from each participating country, who confirmed its validity. The survey was distributed to the managers in charge of those organisations at different sectors and levels: national (ministry leaders, directors of agencies, directors of government services, heads of administrative units), regional (heads of regional governments and regional services for R&I), local (managers of public administration R&I offices) in 48 regions of the 7 countries of Alpine region. Public sector organisations e-mail addresses were obtained from the portals and websites of government authorities in Italy, Austria, Slovenia, Germany, France, Liechtenstein, and Switzerland. Experts from science, business, and public administration from various countries in the Alpine region tested the survey before it was sent out. The final survey was revised and improved based on their recommendations and comments, which helped to eliminate conceptual ambiguities and weaknesses. Data was collected via 1KA (One Click Survey), an open-source online survey application. A personal address was included in the invitation to ensure a higher response rate. The questions in the survey included several different formats, namely: closed questions with numerical estimates and open questions.[4] The data collected enabled a quantitative analysis to be carried out. The purpose and objectives of the survey were explained to all participants at the beginning of the survey to explain possible ambiguities. Two reminders were sent to the participating public administrations.

[4] The survey is available at https://www.fu.uni-lj.si/en/alpine-research-and-innovation-capacity-governance-a-ring/.

Altogether, 768 valid observations were collected. The number of observations for which the analysis was carried out was reduced to 655 (a response rate of 35.6%) because 14.7% had to be excluded due to incomplete information. Our response rate is justified in terms of representativeness as it is slightly higher than the average response rate of 34-35% found in organisational surveys (Baruch & Holtom, 2008; Cycyota & Harrison, 2006; Fulton, 2016). In addition, Rindfuss et al. (2015) found that low response rates do not necessarily indicate a non-response bias. Observations with missing values were listwise deleted after verifying that the deleted observations did not differ significantly from those of the analysed units. Small organisations (with fewer than 50 employees) represent 76.5% (n=501) of all analysed organisations, medium-sized organisations (50 to 249 employees) represent 16.8% (n=217), and large organisations (over 250 employees) represent 6.7% (n=44). Among the analysed organizations, 28.9% (n=189) come from the national level, 33.1% (n=217) from the regional level, and 38.0% (n=249) from the local level. The most represented country is Germany (29.9%), followed by Italy (26.1%) and France (20.0%). It is followed by Austria (10.8%), Switzerland (9.8%), Slovenia (2.6%) and Liechtenstein (0.8%). The distribution by country is presented in Table 1.

Table 1:

Distribution of organisations by country and level of government

Country / Level	Germany	Italy	France	Austria	Switzerland	Slovenia	Liechtenstein	Total
National	54	48	38	22	19	6	2	189
	27.6%	28.1%	29.0%	31.0%	30%	35.3%	40%	28.9%
Regional	69	59	44	24	21	0	0	217
	35.2%	34.5%	33.6%	33.8%	33%	0.0%	0%	33.1%
Local	73	64	49	25	24	11	3	249
	37.2%	37.4%	37.4%	35.2%	38%	64.7%	60%	38.0%
TOTAL	196 (29.9%)	171 (26.1%)	131 (20.0%)	71 (10.8%)	64 (9.8%)	17 (2.6%)	5 (0.8%)	655 100.0%

Source: Authors' own, 2025

3.3. Data analysis

Statistical analysis was performed using the software package IBM SPSS 25.0 and included descriptive statistics, Kruskal-Wallis tests and two non-parametric post hoc tests for the Kruskal-Wallis test were performed. The non-parametric tests were chosen because the data were not suitable for analysis with parametric statistical tools. First, the Mann-Whitney test with a Bonferroni correction was applied. Second, the procedure of Siegel and Castellan (1988) was applied to test the difference between the mean rank of

the compared pairs. This was done by solving the inequality, namely:

$$|\bar{R}_u - \bar{R}_v| \geq z_{\alpha/k(k-1)} \sqrt{\frac{N(N+1)}{12}\left(\frac{1}{n_u} + \frac{1}{n_v}\right)}$$

The left-hand side of this inequality is the difference between the mean ranks of the two compared groups $|\bar{R}_u - \bar{R}_v|$. The right-hand quantity is the value based on the value of z (corrected for the number of comparisons made) and a constant based on the total sample size and the sample size in the two groups being compared (Field, 2009). Further, the Jonckheere-Terpstra test was conducted to examine trends in the data. An effect size was computed based on Rosenthal (1991) using the following formula:

$$r = \frac{Z}{\sqrt{N}}$$

Here, (Z) represents the z-score produced by SPSS, and (N) denotes the total number of observations.

4. Results from the online survey

To represent the willingness of public administration to cooperate with different stakeholders, namely: (3.1) business, (3.2) public administration (PA), and (3.3) universities and research institutions, at various levels of collaboration (city, local, regional, national, and transnational) and in relation to the level of government (national, regional, and local), we used the Kruskal-Wallis test. Table 2 presents the results of three separate analyses, one for each stakeholder, including both the p-values and the mean rank for each level of government. Higher mean rank values indicate a greater willingness of public administration to collaborate with stakeholders in the Triple Helix model of innovation. See Appendix A for a summary of the descriptive statistics.

Table 2:

Willingness of public administration (PA) to collaborate in the Triple Helix at different levels of government

Willingness of the public administration to collaborate with the business community				
Level of collaboration – mean rank	National level of government level (n=189)	Regional level of government (n=217)	Local level of government (n=249)	Sig.
City	337.43	314.20	332.87	3.98E-1
Local	338.39	366.44	286.51	1.30E-5***
Regional	313.39	370.62	301.95	1.19E-4***
National	324.77	346.40	314.42	1.71E-1
Transnational	346.44	368.41	278.78	3.92E-7***
Willingness of the public administration to collaborate with the public administration				
Level of collaboration – mean rank	National level of government (n=189)	Regional level of government (n=217)	Local level of government (n=249)	Sig.
City	311.17	340.24	330.11	2.76E-1
Local	325.29	349.85	311.02	7.20E-2*
Regional	311.84	353.52	318.03	3.89E-2**
National	358.63	333.12	300.29	4.01E-3***
Transnational	378.57	359.68	262.01	5.56E-12***
Willingness of the public administration to collaborate with universities / research institutions				
Level of collaboration – mean rank	National level of government (n=189)	Regional level of government (n=217)	Local level of government (n=249)	Sig.
City	310.43	343.28	328.02	2.06-E2
Local	352.28	356.73	284.53	1.30E-5***
Regional	342.22	364.63	285.28	1.00E-5***
National	339.76	338.14	310.24	1.52E-1
Transnational	397.51	349.61	256.40	2.29E-15***

Note: Differences between groups are significant at the level <0.1 (*), <0.05 (**), <0.01 (***).

Source: Authors' own, 2025

4.1. Collaboration with businesses

The willingness of PAs to collaborate with companies at the local ($H(2) = 22.47$, $p < .05$), regional ($H(2) = 18.07$, $p < .05$) and transnational level ($H(2) = 29.51$, $p < .05$) is significantly influenced by the level of government. Mann-Whitney post-hoc tests were used to test these results. A Bonferroni correction was applied, and the effects for the local, regional, and transnational levels are reported at a significance level of .0167. In addition, the results of the post-hoc test of the difference between the mean rank of each pair for PA willingness to cooperate with companies according to the prescribed procedure (Siegel & Castellan, 1988) also confirmed these findings (Appendix B.1).

Local

It was found that the willingness of PAs to cooperate with local level companies significantly decreased as the level of government shifted from national to local ($U = 19693.5$, $r = -.14$) or from regional to local ($U = 20548.5$, $r = -.21$). Results demonstrate that no difference was found when the level of government shifted from national to regional ($U = 18633$, $r = -.08$). At the local level, the results demonstrate that PAs from national and regional levels have a significantly higher willingness to cooperate with businesses than local PAs, with a weak effect ($-.14 < r < .21$).

Regional

At the regional level, the results demonstrated to some extent similar results to those at the local level. When the level of government changed from the regional to the local level, the willingness of PA to collaborate with business decreased ($U = 21305$, $r = -.19$). Further, when the level of government changed from regional to national, the willingness to collaborate with businesses was also lower ($U = 16970.5$, $r = .16$). At the regional level, no difference in the willingness of PAs to collaborate with businesses was reported between the national and local levels ($U = 22756$, $r = .03$). The results show that the regional level of government has a significantly higher willingness to cooperate with businesses at the regional level than national or local level of government with a weak effect ($-.16 < r < .19$).

Transnational

It appeared that the willingness of PA to cooperate with businesses at the transnational level did not differ when PA came from the regional government level ($U = 19011$, $r = -.06$) compared to the national level. However, when the level of government moved from the national to the local level, the willingness of PA to collaborate with businesses was significantly lower ($U = 18549$, $r = -.18$). Similarly, when the level of government moved from the regional to the local level, the PA willingness to cooperate was also significantly lower ($U = 19742$, $r = -.24$). These empirical results show a week effect ($-.18 < r < .24$), which is quite significant result and indicates that at the transnational level, the national and regional levels of government are significantly more willing to collaborate with businesses than the local level of government.

4.2. Collaboration with public administration (PA)

The willingness of PAs to cooperate with other PAs at regional ($H(2) = 6.49$, $p < .05$), national ($H(2) = 10.99$, $p < .05$) and transnational levels ($H(2) = 51.83$, $p < .05$) is significantly influenced by the level of government. Mann Whitney post-hoc tests were used to test these results. A Bonferroni correction was applied, reporting the effects for national and transnational levels at a significance level of .0167, while the results for the city, local, and regional levels were no longer statistically significant. The results of post-hoc tests confirming these findings can be found in Appendix B.2.

National

It was found that the willingness of PA to cooperate with PAs at the national level did not differ when comparing national and regional levels of government (U = 18927, r = -.07) or the regional and local levels of government (U = 24325.5, r = -0.09). However, when the level of government moved from the national to the local level, the willingness of PA to collaborate with other PAs was significantly lower (U = 19321, r = -.16). This result reveals a weak effect (r = -.16) and suggests that, at the national level, the government demonstrates a significantly greater willingness to collaborate with other PAs than at the local level.

Transnational

Similar to the national level, PA willingness to collaborate with other PAs at the transnational level did not differ between the national and regional levels of government (U = 19221, r = -.06). However, the willingness of PA to cooperate with other PA significantly decreased as the level of government shifted from national to local (U = 15258, r = -.18) or from regional to local (U = 18857, r = -.24), indicating a week effect.

4.3. Collaboration with universities and research institutions

PA willingness to collaborate with universities and research institutions at local ($H(2) = 22.56$, $p < .05$), regional ($H(2) = 23.03$, $p < .05$), and transnational levels ($H(2) = 67.42$, $p < .05$) is significantly influenced by the level of government. Mann-Whitney post-hoc tests were used to test these results. A Bonferroni correction was applied and the effects for the local, regional and transnational levels are reported at a significance level of .0167. The results at the city and national levels were found to be statistically non-significant. The results of post-hoc tests confirming these findings and can be found in Appendix B.3.

Local

It was found that PA willingness to collaborate with universities and research institutions at the local level did not differ when comparing the national and regional levels of government (U = 20213, r = -.01). However, when the level of government changed from the national to the local level (U = 18647.5, r = -.18) or from the regional to the local level (U = 21076, r = -.20), the PA willingness to collaborate with universities and research institutions at the local level was significantly lower, showing a small effect.

Regional

The results at the regional level closely resemble those at the local level. It was found that the willingness of PA to collaborate with universities and research institutions at the regional level does not differ when comparing the national and the regionals levels of government (U = 19081.5, r = -.06). However, when comparing the

national and the local levels of government the willingness of PAs to collaborate with universities and research institutions was lower at the local level, showing a statistically significant decrease of small size (U = 19417, r = -.15). Similarly, comparing the regional to the local government level, PAs exhibited less willingness to collaborate with universities and research institutions at the local level, with a statistically significant decrease observed (U = 20492, r = -.21).

Transnational

Our research findings revealed a significant difference in Pas' willingness to cooperate with universities and research institutions at the transnational level between those from the national and regional government levels. (U = 17360, r = -.14). Comparing the national to the local level, the willingness to collaborate with universities and research institutions decreased significantly (U = 13539, r = -.37). Similarly, the willingness to collaborate was significantly lower at the local level when comparing the regional and the local level PA (U = 19180, r = -.26). We can conclude that if the level of PAs to cooperate with universities and research institutions at the transnational level decreases, it significantly affects their willingness to cooperate with universities and research institutions overall.

If we summarise the results of the survey, we can conclude that the PA prefers to cooperate with the same level at which it is located and that there are differences between the different PA levels. The differences in the willingness to collaborate can be seen at the different levels of the PA and in the type of stakeholders. Cities differ slightly from the others in that they are equally willing to collaborate with all actors within the Triple Helix, but again at the city level. The main concern that emerges from the results is that the local PA has the lowest willingness to cooperate with all actors in the Triple Helix at a transnational level. Local PAs show the highest willingness to cooperate when they cooperate with companies, but still not at the transnational level. Such an attitude can be a major obstacle to the further development of the local area. Synergies of the local area at regional and transnational level in the field of research and innovation are therefore a major obstacle for the local PA. Strategies and transnational policy documents should take these findings into account in order to overcome the unwillingness to collaborate. The main problem for local authorities is probably twofold: a stronger focus on local issues and a lack of administrative capacity for collaborate.

5. Discussion

As mentioned in Introduction several studies (e.g. Etzkowitz, 2002; Jiménez et al., 2021) emphasise the importance of collaboration in the Triple Helix in the field of innovation

and research. PA and therefore policy makers should play an equal role in this collaboration and be actively involved in the process of promoting innovation. Our research has shown that the willingness to collaborate at national and city level is of great importance, while the local level tends to focus on collaboration at the same level and not beyond its own borders. Transnational cooperation is still the domain of policy makers at national level or in larger cities, despite several efforts by the EU through various funding programmes. Further elaborating the survey through the comments, the analysis of the observations from different workshops conducted during the A-RING project, we can identify some barriers to the low level of willingness to collaborate at local level PA.

The first important obstacle is the administrative capacity of the small municipalities. This is in line with other research mentioned (Yanhong & Bohan, 2023; Erwin et al., 2022; McCann & Ortega-Argilés, 2013; Kroll, 2015; Kóňa et al., 2022). All stakeholders stressed during the various workshops and life-learning events in the framework of project A-RING, that the bureaucratic and administrative burden is still high, especially regarding project applications and documentation for reporting. As a rule, these are large projects, which therefore require an even greater administrative effort. This is also a barrier to collaboration with small and medium-sized enterprises (SMEs). SMEs focus on their core business, finding a market and providing their goods and services; research and innovation are not part of the strategy of small businesses. In addition to administrative capacity, SMEs face a second major obstacle: financial capacity. Large projects are too demanding, as the usual co-financing exceeds their capacities. Therefore, the willingness and ability to invest time, human resources and money is low, which hinders SMEs' participation in collaboration projects. Even though the second obstacle was more important for SMEs, we can argue that this is also true for local PA according to the research findings. As mentioned in other research (Keping, 2017; Kooiman, 2003), in most cases, networking and collaboration is only active when it has been established in the past. Consequently, and in line with our research findings, PAs and other stakeholders emphasised that small collaborative projects are better suited to build further collaboration. Smaller funded projects that support networking on specific objectives or innovation/research areas might have a better impact and seem to be the better solution for SMEs and local PAs. For SMEs linked to PA, different institutions acting as business representatives should play a more important role in finding funding and promoting different tenders in specific areas of research and innovation. Therefore the "equals'" role is not perceived as a problem in our findings, as recommended in other research (Jiménez et al., 2021; Danson & Todeva, 2016). Both PAs and other stakeholders pointed out that networking platforms are usually not long-lasting, are not active over a long period of time, are not updated in a timely manner and there are too many to follow them all. Moreover, in most cases PAs do not participate very much in the platforms or labs.

The third major obstacle to PAs collaborating, especially with academic institutions and larger companies, is the territorial issue. Research centres, universities and large companies are usually located in large cities and larger municipalities.

Collaboration with small local communities is therefore more challenging and difficult and could be considered a barrier to innovation, as observed in the research by Leydesdorff and Park (2014).

Furthermore, another identified obstacle was that 'different stakeholders speak a different language.' This means that the main goal of research is not the same for business as it is for academia or PA. The first group wants to make profit, the second wants to publish and achieve research excellence, while PA wants to work according to good governance principles. Networking and collaboration can help to ensure that the different stakeholders speak the same language, as they can promote rotation between the different stakeholders. For example, people from academia could go into business and try to collaborate and learn from them and then come back and "translate" the language of business into the language of academia. The same goes for businesses and public authorities. The small projects should focus on knowledge transfer within the Triple Helix, from one stakeholder to another. This needs to be supported by a continuous R&I ecosystem in which PAs play an important role (Jiménez et al., 2021; Danson & Todeva, 2016).

Based on the results, it is important to emphasise the importance of the interdependence between the local level and other levels. Local problems are often influenced by regional and national policies, which means that local policies need to be harmonised with regional, national and international strategies (Paliokaitė et al., 2021; Villanueva et al., 2022). Potential local problems often have their roots in regional or national policies, suggesting that their impact is not limited to the local level, but has wider causes or consequences, especially when resources, regulations or funding are controlled at a higher level. The findings could be an incentive for higher levels of government to address the insufficient engagement of local public administration in Triple Helix collaboration by introducing policies or programmes that encourage and support stronger partnerships between academia, industry and local government.

6. Conclusion

We can conclude that the research findings have shown that the greatest main barriers to better collaboration in the Triple Helix are at the local level. National PAs and transnational institutions should therefore put more emphasis on supporting collaboration and networking at the local level or delegate such responsibilities to local Pas by making them executors of the work assigned by regional or central levels. Transnational cooperation will have better positive impacts if local actors are willing to work together, as there are commonalities at the local level (territory, culture, tradition, etc.) that can lead to similar goals and expectations.

Nevertheless, the study may have some methodological shortcomings, namely: (i) the arbitrary selection of public sector organisations by the project partners may be a

weakness of the analysis. Therefore, experts from academia, representatives of public administration working in the R&I sector and entrepreneurs were consulted to verify and validate the results of the analysis; (ii) PA respondents might intentionally overestimate their willingness to collaborate with different stakeholders at different levels of collaboration; (iii) PA respondents' assessments might be underestimated if they are not familiar with the content and procedures. All this should therefore be taken into account when using the results or commenting on them in further research or explorations.

Note

Data is available to any interested researcher upon reasonable request.

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Appendix

Appendix A: Descriptive Statistics

Appendix A.1: PA willingness to cooperate with businesses

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
38a city business	655	4.56	1.74	1	7
39a local business	655	5.28	1.53	1	7
40a regional business	655	5.55	1.52	1	7
41a national-states business	655	5.13	1.56	1	7
42a transnational business	655	4.82	1.84	1	7

Appendix A.2: PA willingness to cooperate with public administration (PA)

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
38b city PA	655	5.28	1.74	1	7
39b local PA	655	5.56	1.32	1	7
40b regional PA	655	5.70	1.26	1	7
41b national-states PA	655	5.34	1.51	1	7
42b transnational PA	655	5.00	1.63	1	7

Appendix A.3: PA willingness to cooperate with universities / research institutions

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
38c city uni	655	4.84	1.87	1	7
39c local uni	655	5.41	1.55	1	7
40c regional uni	655	5.32	1.60	1	7
41c national-states uni	655	5.53	1.39	1	7
42c transnational uni	655	5.27	1.41	1	7

Appendix B: Post hoc tests

Appendix B.1: Differences between mean ranks for PA willingness to cooperate with businesses

Level	Governance level	$\bar{R}_u$	$\bar{R}_v$	$\bar{R}_u - \bar{R}_v$	$\lvert\bar{R}_u - \bar{R}_v\rvert$
City	National – Regional	337.43	314.2	23.23	23.23
	National – Local	337.43	332.87	4.56	4.56
	Regional – Local	314.2	332.87	-18.67	18.67
Local	National – Regional	338.39	366.44	-28.05	28.05
	National – Local	338.39	286.51	51.88	51.88*
	Regional – Local	366.44	286.51	79.93	79.93*
Regional	National – Regional	313.39	370.62	-57.23	57.23*
	National – Local	313.39	301.95	11.44	11.44
	Regional – Local	370.62	301.95	68.67	68.67*
National	National – Regional	324.77	346.40	-21.63	21.63
	National – Local	324.77	314.42	10.35	10.35
	Regional – Local	346.4	314.42	31.98	31.98
Transnational	National – Regional	346.44	368.41	-21.97	21.97
	National – Local	346.44	278.78	67.66	67.66*
	Regional – Local	368.41	278.78	89.63	89.63*

Note: * denotes statistically significant difference at .05 level with respect to calculated critical difference for comparisons: National – Regional (≥ 45.19), National – Local (≥ 43.81) and Regional – Local (≥ 42.18).

Appendix B.2: Differences between mean ranks for PA willingness to cooperate with other PAs

Level	Governance level	$\bar{R}_u$	$\bar{R}_v$	$\bar{R}_u - \bar{R}_v$	$\lvert\bar{R}_u - \bar{R}_v\rvert$
City	National – Regional	311.17	340.24	-29.07	29.07
	National – Local	311.17	330.11	-18.94	18.94
	Regional – Local	340.24	330.11	10.13	10.13
Local	National – Regional	325.29	349.85	-24.56	24.56
	National – Local	325.29	311.02	14.27	14.27
	Regional – Local	349.85	311.02	38.83	38.83
Regional	National – Regional	311.84	353.52	-41.68	41.68
	National – Local	311.84	318.03	-6.19	6.19
	Regional – Local	353.52	318.03	35.49	35.49
National	National – Regional	358.63	333.12	25.51	25.51
	National – Local	358.63	300.29	58.34*	58.34*
	Regional – Local	333.12	300.29	32.83	32.83
Transnational	National – Regional	378.57	359.68	18.89	18.89
	National – Local	378.57	262.01	116.56	116.56*
	Regional – Local	359.68	262.01	97.67	97.67*

Note: * denotes statistically significant difference at .05 level with respect to calculated critical difference for comparisons: National – Regional ($\geq$ 45.19), National – Local ($\geq$ 43.81) and Regional – Local ($\geq$ 42.18).

Appendix B.3: Differences between mean ranks for PA willingness to cooperate with universities/research institutions

Level	Governance level	$\bar{R}_u$	$\bar{R}_v$	$\bar{R}_u - \bar{R}_v$	$\lvert\bar{R}_u - \bar{R}_v\rvert$
City	National - Regional	310.43	343.28	-32.85	32.85
	National - Local	310.43	328.02	-17.59	17.59
	Regional - Local	343.28	328.02	15.26	15.26
Local	National - Regional	352.28	356.73	-4.45	4.45
	National - Local	352.28	284.53	67.75	67.75*
	Regional - Local	356.73	284.53	72.20	72.20*
Regional	National - Regional	342.22	364.63	-22.41	22.41
	National - Local	342.22	285.28	56.94	56.94*
	Regional - Local	364.63	285.28	79.35	79.35*
National	National - Regional	339.76	338.14	1.62	1.62
	National - Local	339.76	310.24	29.52	29.52
	Regional - Local	338.14	310.24	27.9	27.9
Transnational	National - Regional	397.51	349.61	47.9	47.9*
	National - Local	397.51	256.40	141.11	141.11*
	Regional - Local	349.61	256.40	93.21	93.21*

Note: * denotes statistically significant difference at .05 level with respect to calculated critical difference for comparisons: National – Regional (≥ 45.19), National – Local (≥ 43.81) and Regional – Local (≥ 42.18).