

MUNICIPALITY SISTERING AND RURAL NETWORK FORMATION: A QUANTITATIVE REGIONAL ANALYSIS IN THE SOUTHERN TRANSDANUBIA REGION OF HUNGARY

PETRA KINGA KÉZAI¹, ZSUZSANNA ZSIBÓK²

ABSTRACT – The 20th century saw the emergence of new urban systems and networks due to globalization processes. Municipality sistering is a classic example of this. Cooperation between municipalities in this way can have a positive impact in many areas, including the economy and culture. However, city diplomacy, a form of subnational diplomacy based on sistering between municipalities in different countries, has received limited attention from scholars in the social sciences. The research presented here examines sistering in the Southern Transdanubia region, specifically exploring the development of networks among municipalities in the Hungarian counties of Baranya, Somogy, and Tolna. The analysis covers 656 municipalities, which can be considered as a rural area as 92.22% of the municipalities have the status of a municipality with a population between 25 and 142,873 inhabitants. The study is based on the analysis of the Hungarian National Association of Municipalities' (TÖOSZ) database of sistering partnerships. IBM SPSS Statistics 21 software was used for the analysis. The study provides an overview of the emergence and development of municipality cooperation in rural area.

Keywords: rural research, municipal diplomacy, municipality sistering, Southern Transdanubia, Hungary

INTRODUCTION

New urban systems and networks have emerged as a result of globalisation processes, playing a significant role in the networked diplomacy of states, fostering international cooperation and democratic representation, and serving as a first line of defence (Morozov, 2023). A good example of subnational diplomacy is twinning, which refers to the establishment of formal or informal ties between towns, cities, institutions, or localities, typically located in different countries (Ryan & Mazzilli, 2024). However, twinning is essentially a formal and long-term cooperation between two municipalities in different countries (Zelinsky, 1991; Kaltenbrunner et al., 2013), and it has received limited attention in the social sciences (Brucker & Finta, 2023). It typically takes the form of a cooperation contract. It can lead to a range of positive effects in economic, cultural and other areas for the municipalities that have entered into the partnership.

Over the past half-century, twinning initiatives have undergone substantial evolution—growing in scope, depth, and complexity—to encompass a wide range of activities rooted in cultural, economic, and social exchange (Ryan 2020a, b). Advocates of cosmopolitanism, such as Zelinsky (1991), interpret this evolution as evidence of a transition toward a more interconnected and globally integrated society.

However, a comprehensive study of a geographical region, with a focus on municipal-level settlements, has not yet been carried out for Hungary. Therefore, this work is primarily exploratory, presenting the twinning network of settlements in the Southern Transdanubia region.

The following questions are analysed in this study: RQ1) What twinning networks have developed among the municipalities of the Southern Transdanubia region? RQ2) What are the

¹ Research fellow, West Hungarian Research Department, Institute for Regional Studies, HUN-REN Center for Economic and Regional Studies, 10 Liszt Ferenc Street, H-9022 Győr, Hungary.

E-mail: kezai.petra@krtk.hun-ren.hu. ORCID: <https://orcid.org/0000-0001-5427-0127>

² Senior research fellow, Centre for Regional and Economic Studies, Institute for Regional Studies, 22 Papnövelde Street, H-7621 Pécs, Hungary.

E-mail: zsibok.zsuzsanna@krtk.hun-ren.hu. ORCID: <https://orcid.org/0000-0001-9383-1134>

differences between the different levels of municipalities in the region? RQ3) What role do neighbouring countries play in twinning relations in the Southern Transdanubia region? RQ4) Does the magic mirror effect, which is well known in the literature, also apply in the Southern Transdanubia region?

The paper is structured as follows: the theoretical framework section summarises the primary literature on twinning relations; the methodology section presents the research data and the methodology used. The results section first describes the settlement structure of Hungary, then that of the Southern Transdanubia region, and subsequently explores the twinning relations of the region's municipalities based on the TÖOSZ database. Finally, the paper concludes with a summary of the research's findings and limitations, as well as future research directions.

THEORETICAL FRAMEWORK

Diplomacy is "the negotiated management of international relations; the method by which these relations are shaped and managed by ambassadors and envoys; the activity or art of the diplomat" (Nicolson, 1969: 4). The primary purpose of a country's diplomatic service is to establish friendly and mutually beneficial relations with other countries (Dietrichsen & Niekert, 2021). At the same time, city diplomacy is the cultivation of foreign relations by city officials. These relations can be with other cities, nation-states, non-governmental organisations (NGOs) or even companies. Its importance has increased in recent decades; it is now more than a symbolic link or cultural exchange - twinning is more than just local events through the presence of visiting delegates from twin cities (Jászberényi et al., 2022). Such cooperation has enormous potential for both urban life and urban development (Acuto et al., 2018) and contributes to the success of municipalities in their settlements (Koltai, 2022; Horeczki & Gonda, 2023). However, the organisation, maintenance and coordination of partner city relations are concentrated in the hands of municipalities (Gergó, 1999).

The studies on paradiplomatic relations can be characterised based on the different levels of how they examine these relations. These levels include municipal, city network, regional, and national levels, as well as other studies.

1) At the municipal level, e.g., Řehák (2013) analysed the case of Prague, while Brucker (2023) examined the case of Budapest with focus on the direct fundings.

2) At the city network level, where city-to-city relations were analysed, e.g., Hartati et al. (2023) examined the sister-city relations between Semarang City (Indonesia) and Jung Gu City (South Korea), highlighting the importance of aligning local policies with international partnerships. Morozov (2023) described in their case study of Antwerp and Saint Petersburg, the global urban centres, the modern form of city twinning, where it was developed as part of public diplomacy at the end of the Second World War and then as a way of intertwining European destinies in the EU after the end of the Cold War. In Central and Eastern Europe, Hilbert (2017) examined the diplomatic relations of Budapest, Prague, Vienna, and Warsaw. He found that, besides geographical proximity, common historical influences and strong cultural relations play an important role in contributing to tight political-diplomatic relations between the capitals. Additionally, in this region, Kézai and Páthy (2023) examined the sister-city relations of regional centres with populations of 100,000 and 1 million inhabitants. They found that Hungarian, Polish, and Romanian cities are the key drivers in sister-city agreements.

3) On a regional level, Bussmann and Nickel (2018) examined how political changes, such as the end of the Cold War, have reshaped transnational municipal cooperation in the Baltic Sea Region, finding that the various EU enlargement rounds appear to be more nuanced. Kamiński (2019) examined successful EU-China cooperation at the regional level, using Poland's Lodzkie region as a case study. He found that individual actors played a pivotal role. Politicians and officials recognised the significant potential of a small-scale business initiative and supported its development through collaboration with local stakeholders. Their efforts helped craft a compelling narrative that resonated with international media and attracted business interest.

4) On a national level, Mori (2023) evaluated the sister-city relationships between Japanese municipalities and Australian counterparts. He emphasised the importance of intra-city arrangements and public administration capacity in successful paradiplomatic engagements. Milani and Ribeiro

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(2011) analysed the paradiplomacy of Brazilian cities and found that capacity-building at the local level play a key role in building international relations.

5) Other scientific papers: Mazzilli (2023) started a debate about the importance of twinning and un-twinning relations in the United Kingdom. According to the literature, sister-city agreements as a tool for paradiplomacy on a regional level have not been examined in the Central-Eastern European region in rural areas or in Hungary yet; therefore, this paper is the first that takes a closer look at the rural NUTS 2 region, the Southern Transdanubia.

METHODOLOGY

Study area

The focus of the research is on the municipal diplomacy of the municipalities of the Southern Transdanubia region, including the twinning networks. Hungary is located in Central-Eastern Europe and is divided into three major socio-economic regions at the NUTS1 level and eight basic regions for regional policy purposes at the NUTS2 level (Figure 1). One of the NUTS2 level regions is Southern Transdanubia (HU32) (Eurostat, 2024).



Figure 1. *The examined NUTS 2 region in Hungary on the map of Europe*
Source: own compilation

The selected basic region contains three counties: Baranya, Somogy and Tolna counties. Figure 2 shows the settlements of Baranya, Somogy and Tolna counties based on the data of the Hungarian Central Statistical Office as of 1 January 2022. In this basic region there are 656 settlements, 92.22% of which are municipalities by legal status, with a population ranging from 25 to 42,873 inhabitants (Hungarian Central Statistical Office, 2022).

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Table 1. *Municipality hierarchy*

Characters	Size	Inhabitants (in person)
Gigapolis	XXXL	> 10.000.000
Megapolis	XXL	5.000.000–9.999.999
Metropolis	XL	1.000.000–4.999.999
Big city	L	500.000–999.999
Middle-sized city	M	100.000–499.999
Small city	S	20.000–99.999
Big municipality	XS	5.000–19.999
Municipality	XXS	1.000–4.999
Small village	SV	500–999
Tiny village	TV	200–499
Mini village	MV	< 199

Source: own compilation based on terport.hu

RESULTS AND DISCUSSION

The settlement structure in Hungary

The settlement structure of Hungary has evolved over many centuries until it took its present form and the administrative areas of the different settlements covered the entire territory of the country without gaps and formed a functional network (Hajdú & Horeczki, 2024). In 2022, Hungary has a total of 3,155 independent settlements across 19 counties (Hungarian Central Statistical Office, 2022), including 2,705 villages, 102 large villages, 324 towns, 18 county seats and 5 cities with county status, and one capital (subdivided into 23 capital districts). The Hungarian population is unevenly distributed between the different types of settlements, with 17% of the total population - nearly 1.64 million people - living in the capital and a further 14% in Pest County.

The Southern Transdanubia region, which is the focus of this study, is home to 9% of the Hungarian population. Baranya county accounts for 4% of the population, Tolna county for 3% and Somogy county for 2%.

The settlement structure of the Southern Transdanubia region

The Southern Transdanubia region comprises 656 settlements in the counties of Baranya, Tolna and Somogy. The three county seats are: Pécs (Baranya county), Szekszárd (Tolna county) and Kaposvár (Somogy county). There are 10 large villages (in Baranya: Beremend, Szászvár and Vajszló; in Somogy county: Balatonszárszó, Berzence; in Tolna: Decs, Fadd, Hőgyész, Nagydorog and Pincehely), 38 towns (in Baranya county: Bóly, Harkány, Komló, Kozármisleny, Mágocs, Mohács, Pécsvárad, Sásd, Sellye, Siklós, Szentlőrinc, Szigetvár, Villány; in Somogy county: Balatonboglár, Balatonföldvár, Balatonlelle, Barcs, Csurgó, Fonyód, Igal, Kadarkút, Lengyeltóti, Marcali, Nagyatád, Nagybajom, Siófok, Tab and Zamárdi; in Tolna county: Bátaszék, Bonyhád, Dombóvár, Dunaföldvár, Gyönk, Nagymányok, Paks, Simontornya, Tamási and Tolna) and 605 villages. Ten of the municipalities are considered large municipalities with a population of at least 5,000 inhabitants. In terms of settlement geography, according to the 2005 Settlement Development Concept, there are 498 villages in the region, of which 141 are small villages with a population of 500-999, 232 are small villages with a population of 200-499 and 125 are mini villages with a population of 1-199 (Zsár, 2016).

Twinning in the Southern Transdanubia region

According to the TÖOSZ database, the number of twinning contacts nationally reaches 3,690 in the 19 counties. The highest percentage of twinning relations (9.46%) is found in Borsod-Abaúj-

Zemplén county, Baranya county (8.30%), Somogy county (7.52%), Pest county (6.93%) and Győr-Moson-Sopron county (6.77%), while Tolna county (3.94%) and Csongrád county have the lowest percentage (1.91%).

In the region of Southern Transdanubia, which is the focus of the present study, a total of 587 partnerships are known (192 in Baranya county, 199 in Somogy county and 142 in Tolna county). Thus, in the three counties, there are 587 connections for 656 settlements, which is less than one per settlement on average, except for Tolna County, where we found an average of 1.3 connections per settlement. According to our database, the national average is 1.17 connections per settlement. In settlements where sister city relationships exist, an average of 2.3 were established in Baranya County, 2.1 in Somogy County, and 2.6 in Tolna County. Of course, we found the most in the county seats, with 18 connections in Pécs, 12 in Szekszárd, and 11 in Kaposvár (Figure 3).

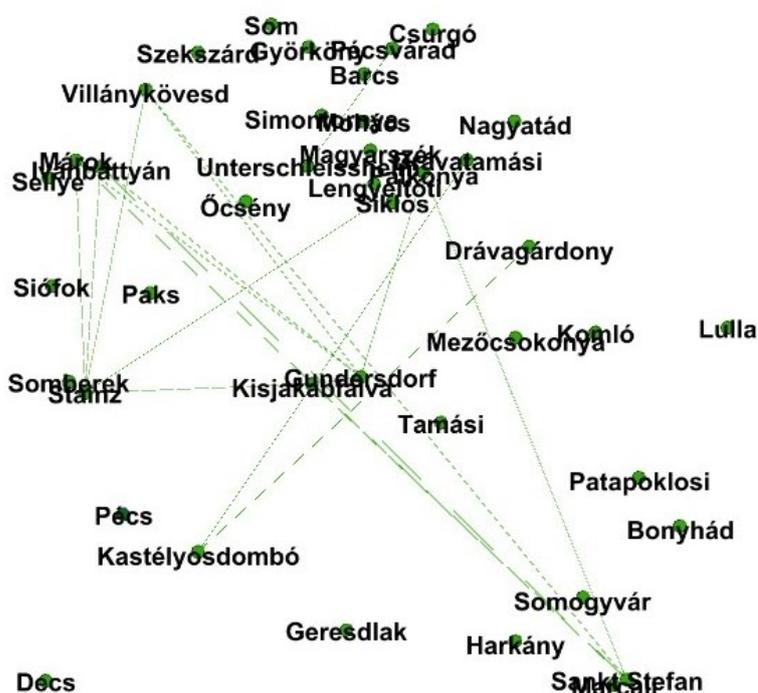


Figure 3. *The network of sister-city relations in the Southern Transdanubia Region comprises a minimum of 5 and a maximum of 18 sister-city agreements*

Source: own compilation by Gephi

We examined the sistering network of settlements in Southern Transdanubia based on distance (the average graph distance between all pairs of nodes), betweenness centrality (measures how often a node appears on the shortest path between the nodes in the network), closeness centrality (the average distance from a given starting node to all other nodes in the network) and on eccentricity distribution (the distance from a given starting node to the fastest node from it in the network) with Gephi network analysis program (Appendix 1). We have found the average degree is 0.463, the average weighted degree is 1.39, the network diameter is two.

The next step was to analyse the proportion of agreements by settlement type in the examined region. Initially, 35% of the agreements were signed with municipalities that have a population range of 100-4999 inhabitants (Figure 4).

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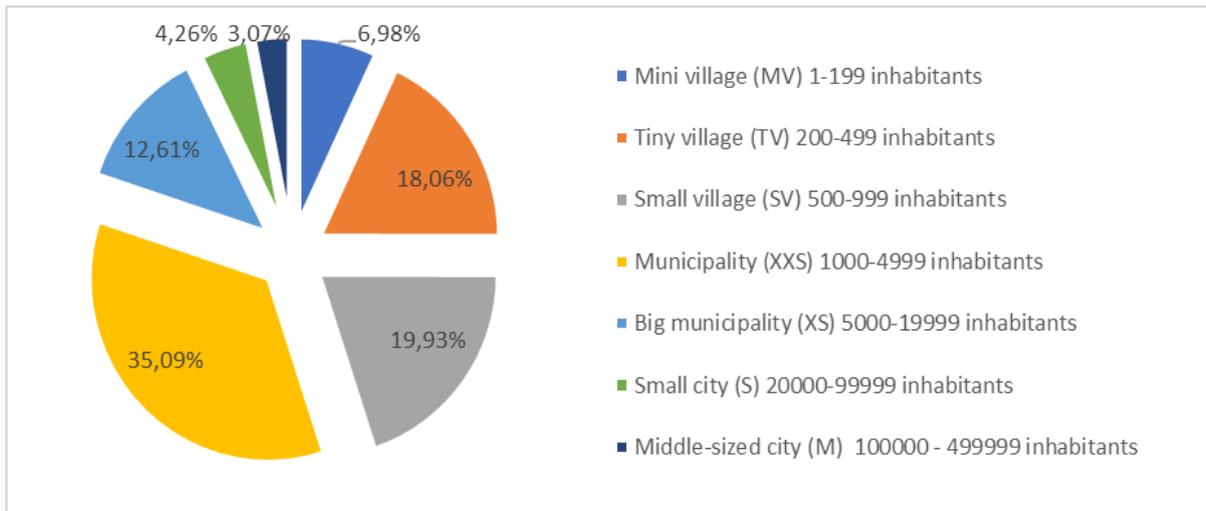


Figure 4. *The proportion of sistering agreements by settlement types in the Southern Transdanubia Region*

Source: own compilation based on TÖOSZ database

We tested the hypothesis that, within the region, more developed municipalities tend to have a greater number of twinning relationships. This positive association may stem from their stronger institutional, financial, and human resource capacities, or from their touristic attractiveness. To test this hypothesis, we used the per capita income subject to personal income tax, averaged over the 2018–2022 period and provided by the Hungarian Central Statistical Office (HCSO), as the explanatory variable. The dependent variable was the number of twinning relationships per municipality, excluding cases with zero partnerships. An OLS regression yielded a statistically significant positive relationship between the two variables ($p = 0.0000$); however, the R^2 value was low (0.08), indicating substantial variability in the data.

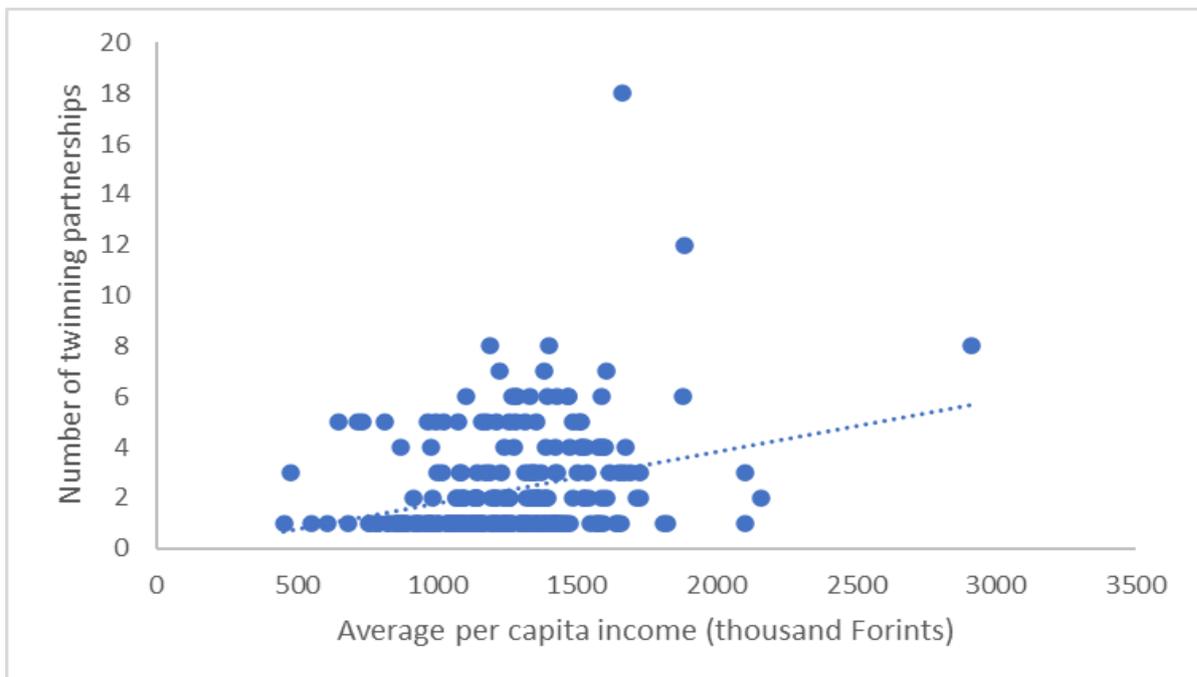


Figure 5. *The relationship between the municipalities' development (measured with per capita income) and the number of twinning partnerships by municipality*

Source: authors' elaboration based on HCSO and TÖOSZ data

In terms of direction, 98.3% of the relations are with the European continent and 1% with Asia (in Baranya County: Harkány with the Russian Kurchatov, Mohács with the Turkish Beykoz and Pécs with the Turkish Kütahya, and in Tolna County Györköny with the Chinese Hubei and Simontornya with the Israeli city of Netanya). Only 0.51% of the connections are with North America: the city of Pécs in Baranya county via the cities of Seattle and Tucson in the United States, and Simontornya in Tolna county via the municipality of Walnut Creek in the United States. The only known link with Central America is the twinning cooperation between Szekszárd in Tolna County and Camagüey in Cuba.

Within the European continent, the direction of relations is typically (77.12%) Central Europe (the other relations are: 1.69% Eastern Europe, 3.81% Western Europe, 4.24% Northern and Southern Europe). 92% of the cooperation is twinning with municipalities in some EU Member States. In addition to the Member States of the European Union, there are 46 agreements with municipalities in the following countries, on the continent: Bosnia and Herzegovina (Paks–Gornji Vakuf and Pécs–Tuzla); United Kingdom (Kaposvár–Bath and Szederkény–Cambridge); Switzerland (Abaliget–Knonau, Balatonföldvár–Steckborn, Drávafok–Marthalen, Hetvehely–Rafz, and Marcali–Wallisellen); Sweden (Dombóvár–Höganäs, and Som–Västernorrland county); Serbia (Ádánd–Kupusina, Birján–Bogaras (Zenta), Bogyiszló–Ada, Bonyhád–Pancsova (Panceva), Decs–Csóka (Čoka), Dunaszentgyörgy–Tornyos (Tornjoš), Gödre–Verbász (Vrbas), Harkány–Péterréve (Bačko Petrovo Selo), Hosszúhetény–Hetin, Lengye–Székelykeve (Skronovac), Lippó–Székelykeve (Skronovac), Lulla–Csonoplya (Čonoplja), Medina–Bács (Bač), Mesztegnyő–Horgos, Mórágypályaföldvár–Bajmok, Pécs–Novi Sad, Szekszárd–Óbecse (Bečej)); Ukraine (Balatonőszöd–Csepe (Csepa), Decs–Csonkapapi (Popovo), Kárász–Mezővári (Vary), Nyim–Tiszasalamon (Solomonovo), Paks–Visk (Vyshkovo), Pellérd–Szalóka (Solovka), Vékény–Asztély (Astei), Zimány–Dercen (Derzen)), and outside the continent: Israel, China, Cuba, Russia, Turkey, and the USA.

In terms of cooperation, the highest proportions were with Romanian (25%), German (22%) and Croatian (9.7%) municipalities. Other important countries are Slovakia (9.37%), Austria (8.18%), Poland (3.07%), Italy (2.90%), Serbia (2.90%) and France (2.73%).

Looking at the number of contacts with Hungary's neighbouring countries, we can see that 337 twinning contacts have been established with neighbouring countries and 228 twinning contacts with other countries. At the same time, there are also registered twinning relations among Hungarian settlements such as Babócsa, Balatonkeresztúr, Bodrogkeresztúr, Darány, Drávagárdony, Drávatamási, Geresdlak, Hajdúböszörmény, Harkány, Hidas, Hidasnémeti, Kastélyosdombó, Kisszállás, Kunmadaras, Lulla, Magyarszék, Mesztegnyő, Nagytevel, Orosháza, Pannonhalma, Pécsvárad, Pinchely, Tengelic, Tényő, Tiszaújváros, Újszentiván, Zebegény and Zomba.

In the following, we examined whether the process known in the literature as the magic mirror also works in the case of the municipalities of the Southern Transdanubia region, since formal and long-term cooperation agreements between two municipalities in different countries, "twin town" or "twin county" partnership agreements, are typically formed with a similar level of territorial unit in the "friendly country" (Figure 6).

Our results tend to confirm this expectation. Mini and small villages do not have links with municipalities larger than small towns as classified in Figure 5. In 80-90% of the surveyed municipalities in the larger size categories, they have established links with municipalities in their own size category or in neighbouring size categories. The exception is the small villages, which have established partnerships with almost all types of settlements in each size category.

Regarding the dates when each municipality concluded the twinning contract, the TÖOSZ database contains incomplete information. The date of conclusion is known in only 40% of the cases. Based on the available data, it can be concluded that the partnerships were typically established after the change of regime, with a notable peak in 2006 when 24 new partnerships were signed.

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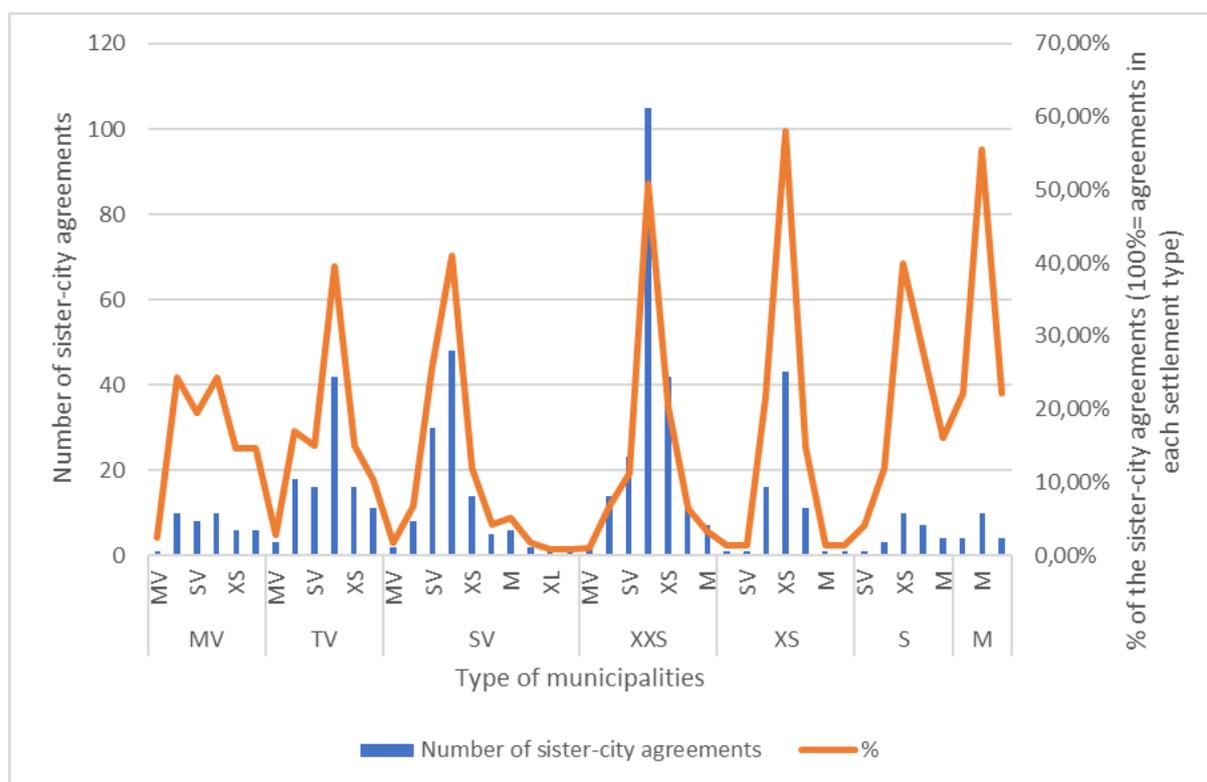


Figure 6. *Sister-city relations by size of the municipalities in the Southern Transdanubia Region*
Source: Own compilation

The research also looked at the nature of the relationships established. Thematic cooperation is relatively limited in terms of direct economic-development relevance, with most activities focusing on cultural, recreational and sporting themes; however, joint projects are also frequently mentioned.

CONCLUSION(S)

This study aimed to analyse the municipal twinning relations of the rural NUTS2 region, Southern Transdanubia in Hungary. The results show that twinning relations were initiated by the settlements studied across the whole spectrum of the region's settlement hierarchy, from the smallest villages to the county seats. The Southern Transdanubia region is moderately active in this respect in the country, but its constituent counties exhibit varying levels of activity. Somogy and Baranya counties are among the counties with the most twinning contacts, while Tolna county has relatively few twinning contacts. In terms of international relations, we observed the so-called 'magic mirror effect,' where municipalities in our sample predominantly sought diplomatic relations with other municipalities of similar size. Our results also demonstrate the impact of geographical and cultural proximity, with only a small proportion of twinning arrangements involving municipalities on other continents and the vast majority of intra-European contacts occurring within the European Union, more often with neighbouring countries.

One of the significant limitations of the results of this study is that it relies on the analysis of the Hungarian National Association of Municipalities' (TÖOSZ) database of sistering partnerships, which contains only 51% of the municipalities (1,600 settlements are members of TÖOSZ), so there might be international relations between municipalities not registered in this TÖOSZ database.

Therefore, we plan to expand our research in several directions. Firstly, we need to update our database. To this end, we are conducting a new survey with the authorities, to update their paradiplomatic relations. Secondly, we plan to collect international databases on a national level for twinning networks. Third, we can deepen our knowledge through additional quantitative tools (such as

network analysis by Gephi) and qualitative studies, in particular on the content and impact of local government diplomacy on local development.

ACKNOWLEDGMENTS

The research was supported by the Project no. 146411 titled „Paradiplomacy in the international arena” by the Ministry of Culture and Innovation of Hungary from the National Research, Development and Innovation Fund, financed under the K-23 funding scheme.

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Appendix 1. The Graph Distance Report

Parameters:

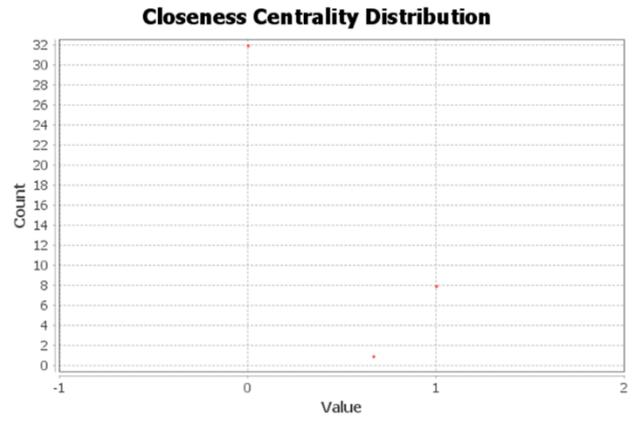
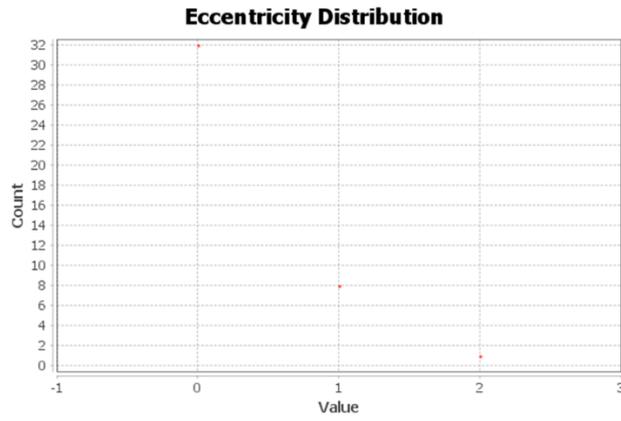
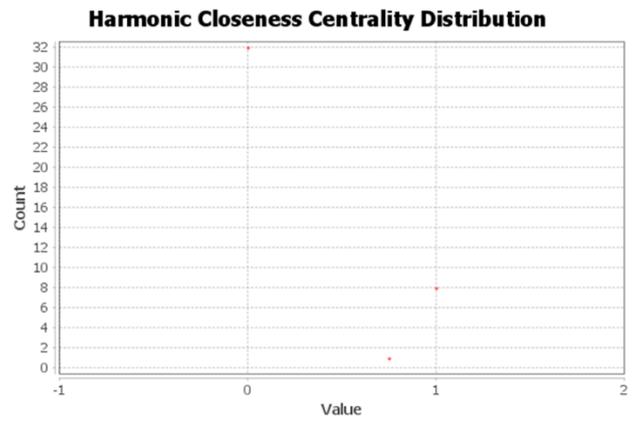
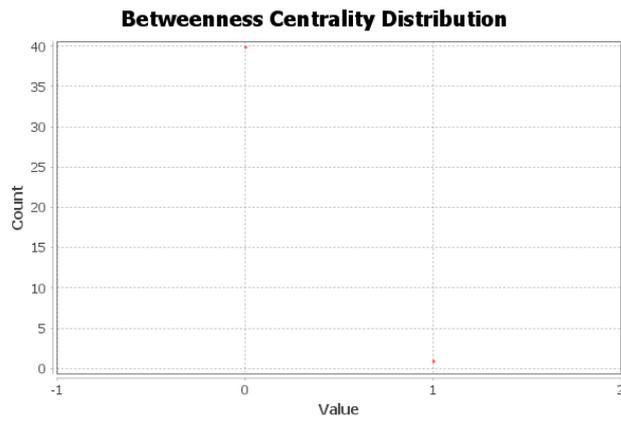
Network Interpretation: directed

Results:

Diameter: 2

Radius: 0

Average Path length: 1.05



Source: edited by Gephi based on Brandes (2001)