

From Westernization to Internationalization: Research Collaboration Networks of Communication Scholars From Central and Eastern Europe

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The internationalization of communication studies has become a trending topic over the past decades, and there have been many efforts to increase the geographical diversity of the discipline. International collaboration has succeeded in internationalizing the field, and different world regions offer particular strategies for cooperation. However, there is no “royal road” for successful internationalization, and different world regions follow their own trajectories. In this article, we discuss the historical, cultural, and disciplinary features of Central and Eastern European (CEE) communication research and then provide an analysis of the region’s international collaboration in research publishing over the past 20 years. Results point to a growing level of CEE internationalization with expanding geographical diversity, but intra-regional collaboration is still weak. We argue that to raise the international competitiveness of the region, CEE communication scholars might have to develop a regional identity by increasing strategic cooperation between different countries of the region.

Keywords: Central and Eastern Europe, coauthorship, internationalization, communication and media studies

As the internationalization of academic research increases, there is extensive scholarly debate on how to establish an inclusive international academic community with a growing number of participating world regions and countries (Demeter, Goyanes, Navarro, Mihalik, & Mellado, 2022; Waisbord & Mellado, 2014). However, while there is an expanding literature on academic internationalization, in general (Thussu, 2009), and the

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internationalization of media and communication studies (MCS), in particular (Park & Curran, 2000), we have limited knowledge on how the visibility of different world regions develops over time. The current study, through an analysis of the geographical dimensions of Central and Eastern European (CEE) media and communication scholars' coauthorship over 20 years, offers several important insights that contribute to the scholarly discussion on how world regions outside of the Western world build their international academic presence. We argue that a focus on CEE MCS research is instructive in at least two ways. First, in a global perspective, the region is part of the periphery: The development of the discipline has been burdened for decades by many factors, including political, financial, and economic obstacles. From this point of view, the results of our analysis go beyond the description of MCS in the CEE, as it offers important insights on MCS's development in other emerging world regions with similar financial, political, and historical trajectories. Second, in a European perspective, CEE is Europe's semi-periphery that shares not only a common socialist past but also historical ties to Western Europe (Minielli, Finch, Lukacovic, Samoilenko, & Uecker, 2021). We argue that these two positions—the global peripheral and the European semi-peripheral—make the region an interesting case for the analysis of MCS's internationalization as the results might point out the strengths and weaknesses of other world regions' internationalization processes; in addition, the results may shed light not only on similarities but also on differences between the development of different world regions. In other words, the region's position in the past 20 years in international MCS might reflect both the past of more developed world regions and the future of less developed ones.

Building on the framework of the internationalization of MCS (Albuquerque & Lycarião, 2018; Park & Pooley, 2008; Simonson & Park, 2016), we analyzed the network properties of CEE scholars' collaboration on publications and found a characteristic pattern that is different not only from the Western process of internationalization (Waisbord, 2019) but also from the internationalization patterns of non-Western world regions such as Latin America (Demeter et al., 2022; Mellado, 2012; Perez, 1990) or China (Miike, 2014; Xu, Oancea, & Rose, 2021; Xu, Střelcová, Marini, Huang, & Cai, 2022). Our results underline the importance of shared culture and history, but they also point to the wider context, showing that, for most CEE scholars, internationalization generally meant collaboration with Western European researchers rather than cooperation with their CEE peers. Building on the results, we propose some recommendations to further enhance the identity and international visibility of CEE media and communication scholarship that can also promote the diversity of the international field.

A Brief History of the Institutionalization of MCS in CEE

Despite many calls for the internationalization (Thussu, 2009) or de-Westernization (Park & Curran, 2000; Waisbord & Mellado, 2014) of MCS, stark differences between the academic center and periphery persist. There are different explanations for the imbalance that can be observed at various levels of international visibility, such as research output, research impact, or memberships in the editorial boards of leading journals (Goyanez & Demeter, 2020).

The origins of the institutionalization of MCS can be traced back to the United States, Germany, and France, where the first university departments and scholarly journals were initiated (Simonson & Park, 2016). The economic explanation finds correlations between countries' economic development—especially when measured in GDP per capita—and their academic output (Demeter, 2019). As the Global North includes more economically developed countries than the Global South, the publication output of authors from the

Global North is significantly higher. Another explanation is political, and it assumes that authoritarian political regimes, with which most countries in the Global South have had a long experience, have prevented the development of MCS (Demeter, 2018).

As a consequence of these historical, economic, cultural, and political factors, the world of academic knowledge production can be divided into two sets of world regions. The first consists of a few central countries, typically located in the Global North, that publish the vast majority of international papers (Reiter, 2018), occupy positions at editorial boards and research committees (Lauf, 2005), and characterize the face of international research by defining academic culture, important topics, methodologies, and theories (Albuquerque & Lycarião, 2018). The countries in the Global South constitute the second, more populous set that typically does not define, but at most follows, international norms, and that lacks, in many cases, the resources to conduct world-class research. From this point of view, however, China occupies a special position, for although it might be categorized as part of the Global South on the basis of its GDP per capita, it has become a leading global actor in terms of academic production and performance (Goyanez & Demeter, 2020).

In terms of inequalities in scholarly representation, CEE belongs to the Global South, together with such world regions as Latin America, Africa, the Middle East, or the developing parts of Asia (Demeter, 2018). Several authors have investigated and discussed the position and identity of MCS in CEE (Demeter, 2018; Lauk, 2015; Peruško & Vozab, 2016; Splichal, 1989). In this literature, the term "peripheral" has often been linked to the status of CEE in MCS. For example, Splichal (1989) described the position of MCS in Yugoslavia as peripheral to the center, while Demeter's (2018) analysis found that the majority of research conducted in the region remains unnoticed by the international community, which demonstrates the peripheral position of the region. To cite a symbolic case, the title of the Central and East European Communication and Media Conference (CEECOM) in 2017 was "Critique of/at/on Periphery?"

The Socialist Era

The development of MCS in the various CEE countries has followed different paths, with each evolving at its own pace. A feature of the CEE institutions is the lack of continuity due to many historical breaks in development amid political and territorial changes (Dobbins & Kwiek, 2017). Many universities in CEE have a long and rich tradition, such as Charles University of Prague, Jagellionian University of Kraków, University of Pécs, University of Vilnius, University of St. Petersburg, and Lomonosov University, among others (Dobbins & Kwiek, 2017), and the study of communication science has developed at some of these universities. For example, communication science flourished in Czechoslovakia in the 1920s, as the nation developed its "journalism science," while in some other countries communication research developed as a part of other disciplines (Peruško & Vozab, 2016). In Poland, not long after the country's transition to a market economy, communication research was established as a sub-discipline of sociology, and university journalism courses also soon appeared (Jiráček & Köpplová, 2008). In Estonia, journalism was part of the language and literature department from 1954 to 1974, and from 1975 onward, it was an independent unit. Sociological research of the media started in the 1960s, when in 1965, the first representative surveys of the media audience in the whole Soviet Union was carried out by Tartu University (Harro-Loit, 2015; Vihalemm, 2001). In Yugoslavia, the journalism department was attached to the faculty of political science (Peruško & Vozab, 2016). In Hungary, the first communication doctoral programs were introduced as part of linguistics or sociology at the University of Pécs and Corvinus University (Gulyás, 2006, 2011; Háló,

2022). There have also been various influences on the development of MCS in CEE, mostly stemming from the West. German *Zeitungswissenschaft* was most influential in Czech Republic, Slovakia, and Poland, while Yugoslav MCS drew more on U.S. scholars (Peruško & Vozab, 2016; Splichal, 1989).

During socialism, in countries under Soviet rule, the dominant theory for analyzing media and communication processes was the Marxist-Leninist theory of journalism, which provided an approach to "measuring and improving the effectiveness and ideological control of media influence" (Jiráček & Köpplová, 2008, p. 3). Demeter (2018) names this period as the era of "Sovietization," as CEE scholarship, especially in the social sciences, regressed under Soviet oppression. During this time, communication as an academic discipline in the region was isolated, with regards to both theory and methodology, from developments in the West (Pálné Kovács & Kutsar, 2014).

Notwithstanding, researchers from Czechoslovakia, Hungary, Poland, Russia, and Yugoslavia participated at the International Association for Media and Communication Research (IAMCR) conferences in the socialist period (Peruško & Vozab, 2016), and some institutions and scholars had good relationships with their colleagues from the West (Pisarek, 2014). The case of George Gerbner illustrates how personal relations can shape international collaboration. In the 1980s, Gerbner, of Hungarian origin, was the editor of the *Journal of Communication*, the flagship journal of the International Communication Association, and it was at this time that the work of several Hungarian scholars was published in this journal. Neither before nor after Gerbner's editorship were any Hungarian papers published in the journal, and there are still no editorial board members (not to mention editors) from the CEE region (Goyanez & Demeter, 2020). Gerbner maintained a very strong relationship with the leadership of the Hungarian Mass Communication Research Center, inviting many of its scholars to the United States and encouraging them to publish in international journals (Demeter, 2020; Gulyás, 2019).

In most of the countries under Soviet influence, Moscow-based universities, such as Lomonosov University, served as a model for establishing journalism education after WWII (Preston, Arnold, & Kinnebrock, 2020). However, some countries under Soviet influence managed to develop a specific research tradition beyond the orthodoxy promoted by Moscow. For example, the Press Research Centre in Poland began working on the topics of media history, public opinion, and audience reception research from the 1960s (Pisarek, 2014), and the aforementioned Mass Communication Research Centre in Hungary published pioneering works on mass communication research and public media attitudes in the 1980s (Demeter, 2020).

As Yugoslavia was not directly under Soviet influence, it took a different path. Its development of the communication discipline started much later, in the 1960s, and was shaped primarily by taking from the corpus of theories and concepts from the developed centers (e.g., Germany or the United States), without developing original theoretical models (Splichal, 1989). Splichal (1989) evaluated the state of the communication discipline as being pre-paradigmatic, meaning that researchers were jumping from one empirical question to another without building a coherent theoretical model. Other researchers built the specific Yugoslav version of administrative science, spurred by the need for the legitimization of certain communication practices under the socialist system. Due to political influence and a lack of infrastructure development, the result was a peripheral, imitative, pre-paradigmatic position of the discipline (Splichal, 1989). Empirical research in Yugoslavia (at its most developed in Slovenia), although drawing on U.S. administrative research, was a "weapon of critique" against the dominant "Marxist theory" of communication (Splichal & Mance, 2018). Another exception from the

Soviet type of communication scholarship was journalism education in Estonia, which was linked to linguistics and thus avoided greater political influence (Preston et al., 2020).

After the Transition

After 1989, the dissolution of socialism marked another historical break in continuity in the region. The interest in studying media and communication increased in CEE as new studies and departments of journalism and media and communication opened, bringing a plurality of different theoretical perspectives (Jiráček & Köpplová, 2008). In the transitional period of the 1990s, MCS scholars from CEE applied and relied on many Western concepts and research paradigms, a time described by some authors as the "Westernization period" (Minielli et al., 2021). This was partly an attempt by CEE researchers to distance themselves from socialist research traditions. Although considered a path to internationalization, it largely led to imitative, Western-centric academic production, using theoretical frameworks and concepts developed in the West (such as agenda-setting or personalization of political communication) and applying them in the CEE setting without much critical evaluation of their appropriateness (Grbeša & Bebić, 2021; Minielli et al., 2021; Vartanova & Dunas, 2021). Even CEE MCS journals tried to adapt to the Western scholarly dominance as most journals from the region that aimed to be indexed in international databases (such as Scopus or the Web of Science) promoted Western authors and topics, and research found that the more Western-centric a CEE communication journal was, the more impact it received from the international community (Tóth, 2018). Thus, editors were interested in publishing papers on Western topics and from Western authors (Tóth, 2018).

Many MCS scholars turned to the analysis of the transformation of media systems and media democratization in CEE (Lauk, 2015) at this time. Lauk (2015) characterizes research in the 1990s as being mostly dedicated to single-country studies that described transformations in their media systems. Once again, these developments were not distributed evenly among all of the post-socialist countries. For example, the 1990s in Croatia was marked by a stark regression in the theoretical and methodological development of the field (Peruško & Vozab, 2017).

From the mid-2000s, research turned to a more systematic comparative analysis of media systems transformations (Lauk, 2015). This was followed by a closer cooperation between CEE communication and media scholars in joint projects, networks, and conferences (Lauk & Barczyszyn-Madziarz, 2019).² During this period, scholars from the region embraced certain approaches from their local academic traditions (Vartanova & Dunas, 2021) and created more original work that did not necessarily rely on Western concepts (Grbeša & Bebić, 2021). Certain institutions, such as the Central European University in Hungary, played an important role in supporting the development of MCS in the region (Szabo, 2021). Many academic journals dealing with MCS were established and rose to prominence; perhaps the most notable among them is *Javnost/The Public*, published in Slovenia from 1994, which is also specific for its inclusion of a higher diversity of authors.

² The COST network "East of West: Setting a New East European Media Research Agenda" COST A30 (2005–2009) was one of the first networks focusing on media in CEE, coordinated by the Centre for Media and Communication Research of the Central European University in Budapest (Lauk & Barczyszyn-Madziarz, 2019). ECREA CEE Network is engaged in establishing contact between CEE scholars, and CEECOM is an annual conference aiming to present media and communication research from CEE.

At present, Scopus, one of the most popular databases for international peer-reviewed journals, indexes 36 communication journals published in the CEE region.³ The highest-ranking journal is *Informatics in Education*, published by Vilnius University in Lithuania, and Poland is the most represented with 11 journals on the list. Many CEE countries are not represented at all (e.g., from Southeastern Europe: Albania, Bosnia and Herzegovina, Kosovo, and North Macedonia; from the Baltics: Estonia and Latvia; from Eastern Europe: Belarus, Moldova, and Ukraine).

However, the lack of continuity in the development of MCS has created problems for the institutionalization of the discipline in some CEE countries. For example, in Hungary, the highest academic degree (Doctor of the Hungarian Academy of Sciences) is not available in MCS; therefore, all researchers in these fields have to apply for the degree through different disciplines such as sociology, political science, or even literature (Gulyás, 2020; Szabo, 2019). In Croatia there are also institutional weaknesses, as MCS is not developed as a separate field but as a subdiscipline under information science, hosted together with studies of information systems and library studies (Peruško & Vozab, 2016). Similar problems are noticed in Russia, as “Russian media studies still lack a shared terminological apparatus, a well-formed theoretical foundation, and clear disciplinary boundaries” (Vartanova & Dunas, 2021, p. 154).

Current Trends Toward Internationalization

The 2000s were marked by the wider transformation of CEE higher education systems under the process of European integration, which included the introduction of the Bologna system (Dobbins, 2011). This transformation was related to the inclusion of market logic in academia and was also followed by a decrease in state funding for research, which put CEE research in a weaker position (Dobbins, 2011). This transformation was followed by increasing calls for the internationalization of CEE research and also created a gap between “globally-connected research-focused ‘internationalists,’ most often of younger generations, and teaching-oriented ‘locals,’ most often of older generations” (Dobbins & Kwiek, 2017, p. 522). Recently, a growing number of universities and research institutions in CEE have enacted policies that prescribe excellence measurements based on global university rankings and their publication requirements (Dobbins & Kwiek, 2017).

Internationalization also provides a special set of forces that exaggerate existing inequalities between the Global North and South. CEE has the characteristics of the Global South in terms of GDP and scientometrics—the vast majority of journals from the CEE are not indexed in international databases, and the visibility of CEE media and communication scholarship is extremely low in terms of both research output (measured by the number of published papers in international journals) and research impact (measured by citations; Háló, 2022).

Notwithstanding, to meet international standards, young CEE scholars with ambitions to internationalize their careers are expected to publish in high-ranking journals. To do so, they have to learn to

³ SCImago Journal & Country Rank portal draws information from the Scopus database (<https://www.scimagojr.com/>, accessed July 6, 2022). Javnost/The Public did not appear under the results as it is now owned by the Taylor & Francis Group based in the United Kingdom. The countries represented in the results are: Bulgaria, Croatia, the Czech Republic, Hungary, Lithuania, Poland, Romania, Russia, Serbia, Slovakia, and Slovenia.

write academic English using the Anglo-Saxon academic writing style and should publish in the thematic clusters and epistemologies recognized by high-ranking journals, which may be significantly different from their local academic tradition. CEE authors are lagging behind their Western colleagues in publishing (Harro-Loit, 2015; Štetka, 2015). A network analysis of leading publications in the media and communication field found that CEE authors and countries are almost invisible in this discipline, as most publications are written by authors from a few "winner countries," typically located in the Western world (Goyanez & Demeter, 2020).

CEE scholars are underrepresented as authors and as members of editorial boards in higher-ranking journals (Demeter, 2018). The only exceptions are CEE scholars based in Western universities, who have more opportunities to publish in higher-ranked journals (Tarasheva, 2011). The United States, Germany, the United Kingdom, and some other Western countries stand firmly in the communication discipline core, while CEE scholarship is scattered on the periphery. The core countries are marked not only by the quantity of published research but also by their interconnectivity. CEE countries, however, have only loose ties to the academic center and are also disconnected from each other (Demeter, 2018).

To contribute to the growing literature on the development of the CEE media and communication field, the aim of this article is to describe the patterns of internationalization of MCS research in CEE on a longitudinal scale, from 2001 to 2020. Although the position of MCS research in CEE has been analyzed earlier (Demeter, 2018; Lauk, 2015; Peruško & Vozab, 2016; Splichal, 1989), the longitudinal patterns of international cooperation of CEE scholars inside and outside the region have not been explored so far. Therefore, we propose the following research questions:

RQ1: What are the longitudinal patterns of international cooperation between media and communication researchers from Central and Eastern Europe from 2001 to 2020 (in terms of coauthorships between authors and institutions)?

RQ2: Which actors and connections, between which countries, are the most central (in terms of most frequent coauthorships) in media and communication research in Central and Eastern Europe?

Methods

Data Collection

CEE is a diverse geographical and cultural space, and the term "CEE" could be defined as "a social construction of the Cold War, a set of countries who were subject to rigid communist rule and the imposition of a planned and quota-based economy" (Dobbins, 2011, p. 18). There are different classifications of countries belonging to the region. The United Nations Statistics Division (UNSD) classifies only nine countries as being part of the region, while others expand the classification to include Southeastern European, the Baltics, and some Euroasian countries; this extended classification includes 23 countries (Dobek-Ostrowska, 2015; Goyanez & Demeter, 2020).

In this study, we chose the classification based on methodological considerations. SCImago and Scopus define Eastern Europe as consisting of the following countries: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, Georgia, Hungary, Latvia,

Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, the Russian Federation, Serbia, Slovakia, Slovenia, and Ukraine. Accordingly, we considered CEE as the set of countries directed to the category "Eastern Europe" by SCImago, without consideration of possible alternative categorizations. The country of the researchers in this analysis is based solely on the country of their academic affiliation at the time of publication, and it does not refer to the country of origin or the nationality of the researcher. This is in line with the coding of Scopus, as it identifies the authors' countries on the basis of their affiliations.

Data was downloaded from the Scopus bibliographic database. We selected articles published between 2001 and 2020 by at least one author affiliated with a CEE institution, according to the category in the SCImago Institution Ranking (N = 3,441). As Scopus does not automatically filter results by "Communication" (this field is included in the broader category of "Social Sciences"), we restricted our search to articles published in journals in the "Communication" subject category according to the latest edition available at the time of our study (2020) of the SCImago Journal Rank. To analyze longitudinal patterns, we divided the sample into four five-year periods: 2001–2005 (n = 85), 2006–2010 (n = 314), 2011–2015 (n = 837), and 2016–2020 (n = 2205). As contrasted with other disciplines and world regions, the growth of published international research in CEE communication studies follows a general trend with a huge increase in published papers. However, there are several differences across disciplines and regions. From 2001 to 2020, there were 750% more Scopus-indexed CEE papers in psychology and 1,198% in economics, while the same figure was 2,594% for communication studies. In this case, the significantly higher growth in communication is most likely a consequence of the discipline's short history. In contrast, many other social science disciplines were already established by the end of the 1990s. In terms of world regions, the growth in MCS was 1,151% in the Asiatic region and 10,284% in Latin America, while communication studies grew 2,594%, much higher than in Asia but much lower than in Latin America.

Data was retrieved on June 26, 2021, and we generated the .net file (network data) through VosViewer. We used Gephi and Pajek to convert the bibliographic information into network data. Before generating the final networks, the information was manually harmonized by one of the authors to detect errors and remove duplicates and variants in the names of the countries. For instance, Gierałtowiec appeared as a nation and was converted to "Poland," and many authors were assigned to Georgia when they were in fact affiliated with the University of Georgia in the United States. Overall, 98 countries were harmonized to 82 countries.

Analysis

Each network is composed of vertices or nodes (countries, in this study) connected by links (edges). Each link stands for an occasion on which researchers from different countries collaborated on a published paper. We calculated the following structural indices for each network:

Number of Nodes: Provides the Total Sum of Vertices in the Network

Components: These are the smaller combinations of nodes connected to each other inside the wider network (Sosa, Eppinger, & Rowles, 2007). The size of the main component measures the percentage of vertices integrated into the largest component in the network. A large number of components may be representative of specialized communities (Fatt, Ujum, & Ratnavelu, 2010), and a large principal component

may indicate the extent to which the discipline is structured around a basic or cross-cutting theme (Segado-Boj, Gómez-García, & Díaz-Campo, 2022).

Clustering Coefficient and Transitivity: Some nodes are more frequently linked together than they are connected to the rest of the network. The clustering coefficient computes the proportion of vertices connected to a node that, in turn, are also connected to each other (Zhu & Guan, 2013). In other words, it calculates the probability that a node links to other neighboring nodes within its community. The higher this clustering index, the more closely connected these communities are (Yan, Ding, & Zhu, 2010).

Transitivity: This also measures the clustering of the network but, unlike the clustering coefficient, it takes the nodes with the highest centrality as a basis for its calculation. Thus, a low transitivity index indicates that the network is composed of divided communities that connect very little with each other and only weakly or infrequently when they do so. Conversely, a high transitivity index indicates that no communities are distinguished in the network (Hicks, Coil, Stahmer, & Eisen, 2019). In both cases (transitivity and clustering coefficient), the highest value would be 1, implying that all nodes and communities are tightly connected among them, while a 0 value would mean that all vertices and clusters are isolated.

Centrality Values: The centrality of a network indicates the degree to which one vertex exclusively or a few vertices show a large number of connections (Schoen, Moreland-Russell, Prewitt, & Carothers, 2014). An index equal to 1 would imply that one node would be linked to all nodes in the network and that the rest of the vertices would be connected only to that initial node, resulting in a star-shaped graph. Conversely, an index equal to 0 would indicate that all nodes are equally connected to each other, resulting in a representation as a circular graph (Olmeda-Gómez, Perianes-Rodríguez, Ovalle-Perandones, & De-Moya-Anegón, 2008).

Betweenness Centrality: This measures how many times a node lies on the shortest path between other vertices (Newman, 2005), thus connecting nodes that otherwise would be unconnected between them.

Representation

We used Kamada-Kawai (Figure 1) and Force Atlas 2 (Figures 2–5) algorithms and visualization (Jacomy, Venturini, Heymann, & Bastian, 2014; Kamada & Kawai, 1989). To provide graphs that are easy to understand, we applied a reduction strategy to highlight the most meaningful elements (actors and connections) in each network. We followed frequency criteria to remove the less common coauthorships, so as to focus on the most meaningful relationships in the period. The threshold applied for each figure is specified on figure legends. In all cases, isolated vertices were removed. Each node represents a country, with its size being proportional to the number of documents published in the period analyzed. Links between vertices represent a collaboration between the countries, as expressed by the number of coauthored papers between researchers working in the corresponding countries. The number next to each link stands for the frequency of such coauthorship, that is, the number of documents that said actors have published in the given period.

Results and Discussion

In general, network properties show a clear trend of internationalization: from a relatively loose network with unrelated hubs, a giant component emerged by the end of the 2010s. This included most of countries, as can be seen in the percentage of the largest component, which increased from 60% to over

90% between 2006 and 2010 (Table 1). Over the past two decades, more and more CEE countries have collaborated with an increasing number of international scholars from different countries, and the number of participating countries has tripled since the turn of the millennium (see Table 1 and Figure 1).

Table 1. Network Properties of Collaboration in Each Period from 2001 to 2020.

	2001–2005	2006–2010	2011–2015	2016–2020
<i>Nodes</i>	25	44	63	77
<i>Components</i>	8	5	3	1
<i>Largest component</i>	15	40	61	77
<i>Largest component (%)</i>	60	90.91	97	100
<i>Clustering (Watts-Strogatz)</i>	0.43	0.60	0.68	0.73
<i>Clustering (Transitivity)</i>	0.33	0.42	0.57	0.57
<i>Centrality</i>	0.20	0.43	0.39	0.52
<i>Betweenness</i>	0.21	0.28	0.15	0.12



Figure 1. Evolution of the coauthorship network from 2000 to 2020.

There are fewer and fewer separated hubs of collaborating countries as the years progressed, and by 2020, a huge complete graph of collaboration emerged in which all collaborating countries could be approached either directly or through a limited number of intermediate edges. This development might support the academic version of the small world hypothesis (Watts, 1999), according to which every country can be reached through a short chain of academic cooperation. Moreover, the betweenness centrality measures of the network have been decreasing continuously over time, meaning that there are not only more frequent but also more diverse collaborations between scholars from different countries; accordingly, the importance of big, central countries is decreasing slightly.

In the first five years of the 21st century, collaboration between CEE scholars from different nationalities was rare, as was any type of international coauthorship. As Figure 2 represents, we find that the most intensive international cooperation of CEE countries was with Western coauthors, especially with scholars from the United Kingdom and the United States. The international network is Eurocentric, as there are no coauthored papers with scholars beyond the Western world. Among CEE countries, Hungary occupies a central position in terms of international collaboration; but, interestingly, it has no coauthored papers with researchers in other CEE countries. The same holds for Poland, which cooperates with foreign authors, but this collaboration is restricted to Western countries. The graph clearly shows that in this period, the typical form of international collaboration was coauthorship with Western countries. When CEE countries started to internationalize their communication and media scholarship, this amounted to making connections with already established Western scholars.

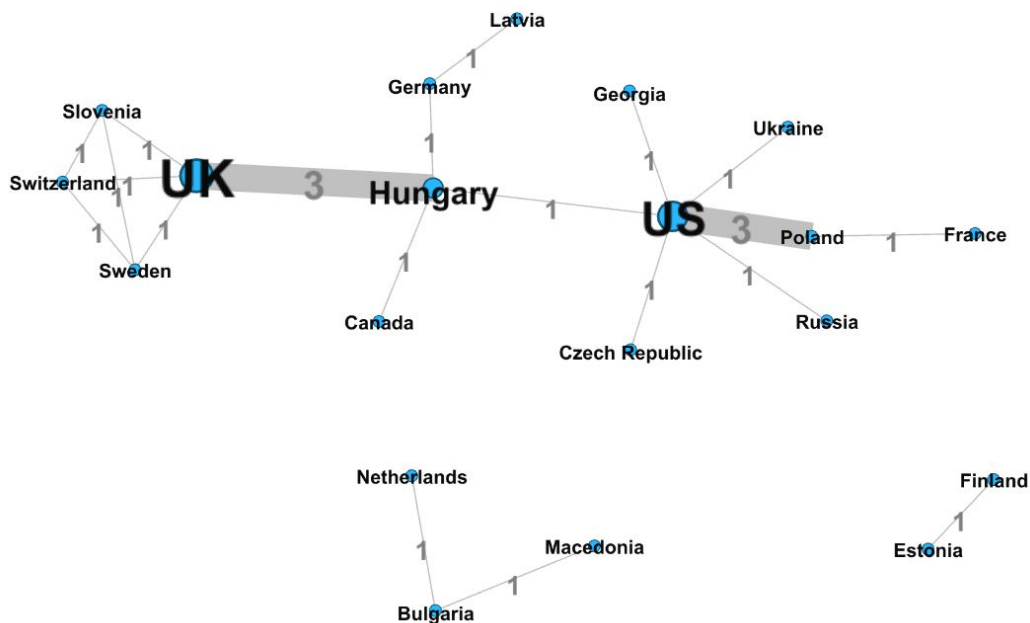


Figure 2. Coauthored papers of CEE scholars from 2001 to 2005. Edge numbers represent the number of coauthored papers, and node size refers to the publication prolificacy of countries. Threshold: minimum edge weight = 1.

This phenomenon can be interpreted in several ways. First, we can assume that CEE media and communication scholars lacked knowledge on various aspects of the international community, including proficiency in academic English, current international methodologies, and communication theories, and they might not have been familiar with Scopus-indexed international journals. Thus, CEE scholars who wanted to publish at this time may have had to cooperate with Western coauthors who were well-versed in the standards expected in international academia—knowledge that CEE researchers could not acquire from their regional peers.

Second, as the post-socialist region's media culture was still interesting for Western researchers, they may have reached out to CEE media and communication scholars to offer collaboration.

We can assume that the need for internal CEE media and communication research was still missing, or, even if the need was recognized, the circumstances in which the CEE scholars were working did not support this need. For example, it was difficult to get funding for conference trips abroad where scholars could meet face to face, compare their research, and find topics of common interest. Consequently, cooperation—at least on the level of journal articles—was sparse among CEE researchers from different countries of the region. The internationalization aspirations of regional higher education were still underdeveloped, which might also explain why international collaborations amounted to invited coauthorships with Western scholars.

Third, international collaboration is frequently a result of personal discussions on professional meetings such as international conferences, and most of these events were organized in the West. This factor may have influenced the typicality of Western-CEE cooperation in MCS research at the time.

While the international network of MCS scholars become more complex in the next period analyzed (2006–2010), the centrality of Western scholarship in the internationalization process of CEE remained (Figure 3). There was still no international collaboration with non-Western scholars. The United Kingdom and the United States maintained their leading positions, and most CEE countries now had some cooperation with one of these Western countries.

Australia, another native English country, joined the CEE network through its strong ties with Slovenian research. Hungary's leading position among CEE countries was contested by Russia, which had strong ties with both the United Kingdom and the United States in the period under review. Another important change is that the collaboration network became more tightly knit than in the first period. While between 2001 and 2005 there were sub-networks of international collaboration without ties to the giant components of the most collaborative countries, between 2006 and 2010 the network became fully connected. This shows that internationalization develops over time with stronger connections between cooperators and also through a more diverse pattern of collaboration with different countries.

Another important improvement is that, while it is still atypical, collaboration between two different CEE countries is now visible, which indicates a successful learning process regarding international standards. It is now possible for CEE authors to publish in international periodicals without a Western coauthor, and CEE countries have started to collaborate with each other. However, at this stage of development, the typical CEE-CEE cooperation consists of joint projects between countries having close ties geographically, historically, and culturally such as Slovakia and the Czech Republic, or Croatia and Slovenia.

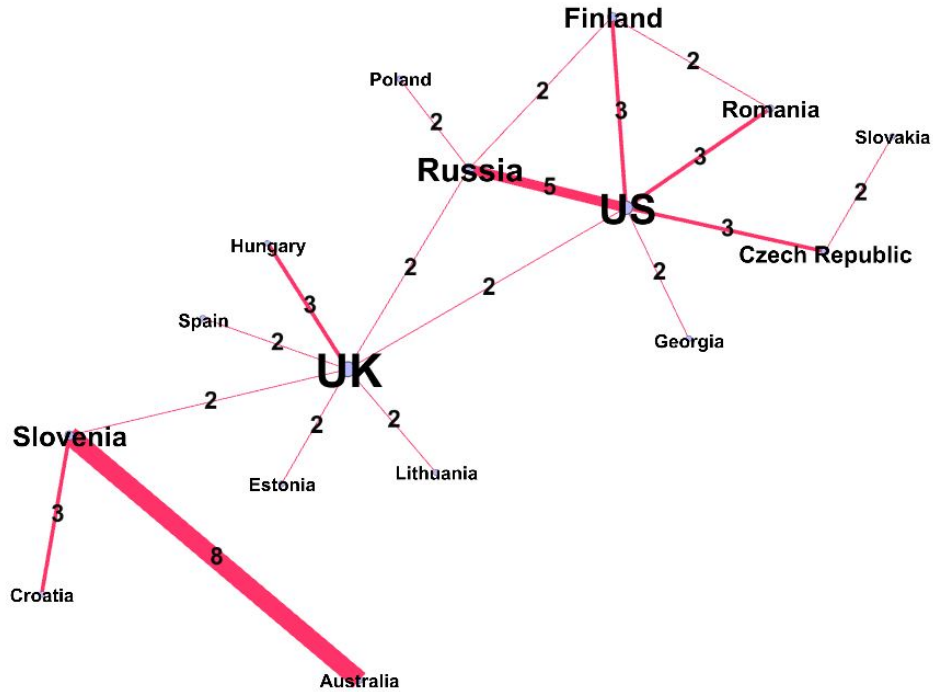


Figure 3. Coauthored papers of CEE scholars from 2006 to 2010. Edge numbers represent the number of coauthored papers, and node size refers to the publication prolificacy of countries. Threshold: minimum edge weight = 2.

The most striking development in the next period analyzed (2011–2015) is the increased intensity of international collaboration, as the number of international papers is much greater than before. Besides already established centers of collaboration (the United Kingdom and the United States), other Western countries appeared in the CEE network, such as Spain, France, Germany, and the Netherlands. Russia further reinforced its role as the central country in the region, as it had many coauthored papers with North-American scholars and also collaborated with Western European (Spain and the United Kingdom) and Eastern European (Poland and the Czech Republic) countries. Poland had a similar position, with strong ties to both Western European and Eastern European countries, and with the United States as well (Figure 4). Meanwhile, the most striking pattern is the appearance in the CEE network of additional Western European countries that cooperated, typically individually, with different CEE countries.

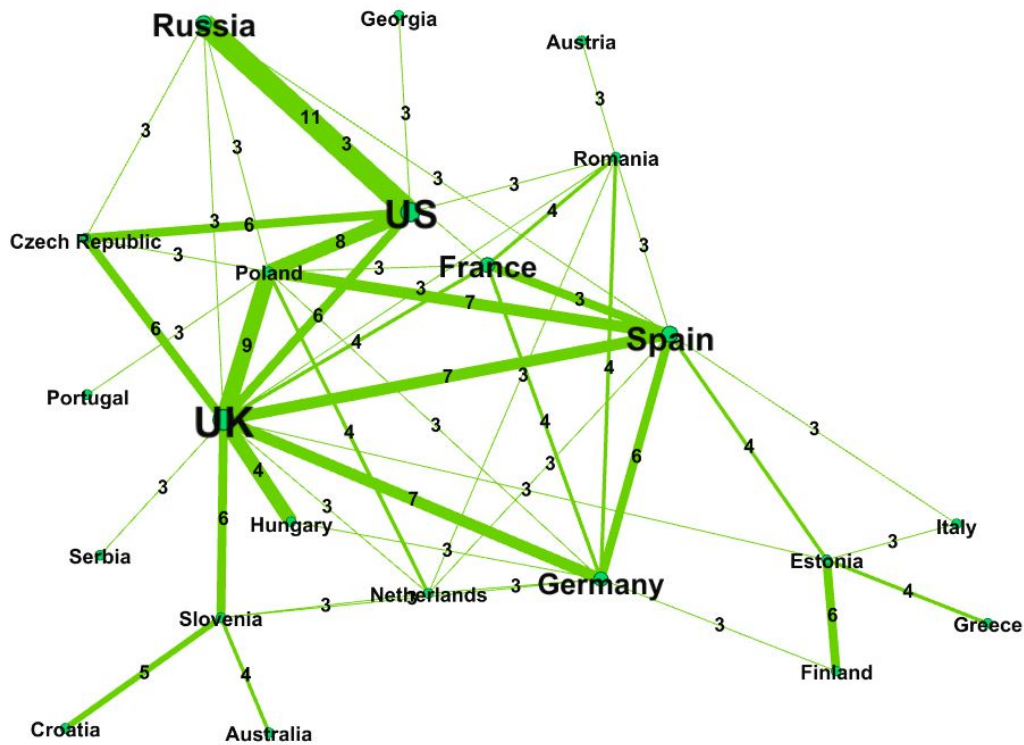


Figure 4. Coauthored papers of CEE scholars from 2011 to 2015. Edge numbers represent the number of coauthored papers, and node size refers to the publication prolificacy of countries. Threshold: minimum edge weight = 3.

There can be different but still interrelated interpretations of the findings. First, the “publish or perish” paradigm became more prevalent at that time; therefore, publication output rose significantly in the 2010s. Consequently, the average number of published papers increased in all countries, which may have resulted in a growing number of papers with international collaboration as well.

Second, MCS research became more complex, which necessitated cooperation between scholars from different fields and countries. Moreover, as the number of publications increasingly had an impact on their careers, authors wanted to publish more, which may have rendered international journals more selective in their publication process, favoring papers with a broad, international scope of data—a factor that further enhanced the significance of international collaboration.

Third, the internationalization of higher education became a more urgent issue in the CEE region, and university policies put more emphasis on international rankings than before. As international publication performance and international collaboration are important factors in most global university rankings, state policies started to reward international cooperation that influenced publication patterns. Finally, the number of Scopus-indexed CEE MCS journals was continuously rising, which resulted in a greater visibility of the

region on an international scale. However, while the network of international cooperation is both more closely knit, with stronger cooperations, and more expansive with a more diverse set of countries, the internationalization of CEE communication and media studies is still Eurocentric without significant collaboration with any non-Western countries. This process, however, can be explained (at least partially) by the expansion of the EU, which affected the scholarly operation of many CEE countries. For example, it became easier to access EU research networks and to participate in EU projects such as the European Framework Programmes and HORIZON.

The most rapid growth of internationalization can be seen during the last period studied (Figure 5). While in the first period (2001–2005), we were able to represent even those connections where authors from different countries published only one joint paper, here the threshold is six and the graph denser than ever before. The strength of connections between established collaborators was huge: more than 20 Polish/British coauthored papers were published, and the extent of collaboration was similar in the case of the United States and Russia, Poland and Germany, Russia and the United Kingdom. From the CEE region, Poland and Russia became central actors with dozens of collaborative ties to both Western European and Eastern European countries. From the Western world, Germany and Spain grew to become as important in the network as the United States and the United Kingdom, with an especially significant connection with Poland.

Notwithstanding, intra-regional cooperation is still relatively rare, as most countries in the central part of the CEE region have significantly more collaborations with Western researchers than with other regional scholars. Poland has many more coauthored papers with the United Kingdom, the United States, Germany, Spain, and even China and Malaysia than with any CEE countries. The same holds for Russia; that is, in terms of collaboration, it is closer to the United Kingdom, Germany, and the United States than to CEE countries. In short, those CEE countries that significantly increased their international visibility and expanded their international networks typically connected with countries beyond the CEE region without constructing a coherent and distinguished regional network such as, for example, the Ibero-American network (Demeter et al., 2022).

However, individual-level networks of some highly productive CEE media and communication scholars have a visible influence on international cooperation patterns in the past few years. Specifically, the Polish scholar Marzena Swigon published dozens of Scopus-indexed papers with Spanish, French, and Chinese researchers, and also with scholars from Malaysia, Russia, and the United Kingdom. Similarly, Marton Demeter from Hungary published several papers with the Spanish scholar Manuel Goyanes, while Dejan Verčič (Slovenia) published many papers with German and American scholars. Despite such examples, international ties are generally the result of the collaboration of many different researchers; these “modern-day Gerbners” also influence the development of international cooperation in the CEE.

Besides the growing internationalization tendency, the most important improvement was that the regional network was finally complemented with emerging Asian countries such as China and Malaysia. Thus, the last years of the 2010s experienced the beginning of real internationalization that went beyond Europeanization.

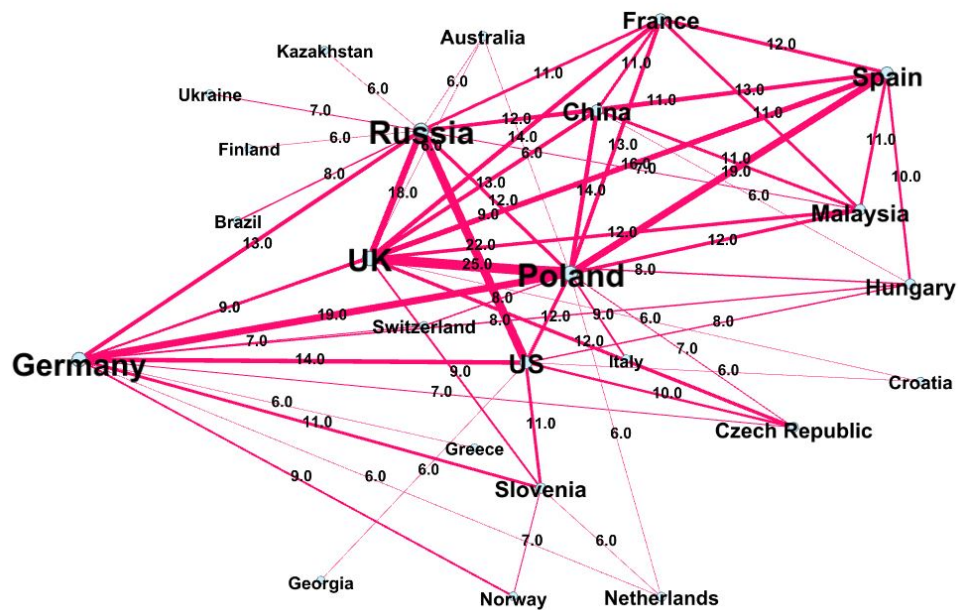


Figure 5. Coauthored papers of CEE scholars from 2016 to 2020. Edge numbers represent the number of coauthored papers, and node size refers to the publication prolificacy of countries. Threshold: minimum edge weight = 6.

This latter finding can be explained by the fact that internationalization processes were especially supported by China and other Asian countries in the middle and late 2010s. For example, researchers in China were forced to publish in international journals and to collaborate with international, preferably North American or European, scholars (Xu et al., 2021). While CEE might be considered as a semi-periphery in a world-systemic context, from an Asian perspective, it is clearly Europe; therefore, Asia-CEE collaborations might be highly supported by Asian higher education and research policies.

Conclusions and Recommendations

As stated by many scholars from the region (Demeter, 2018; Peruško & Vozab, 2016; Splichal, 1989), communication and media studies are still consolidating disciplines in CEE. In the past two decades, a strong academic internationalization has taken place at an accelerating pace, leading to more and more papers published in international journals. However, this internationalization process has its characteristic features. To summarize our findings in a single statement, we would say "culture and geography still matter."

First, as the international field is governed by the Anglo-Saxon academic culture, the internationalization of CEE, especially in the first years, was driven by native English countries such as the United Kingdom, the United States, and later Australia.

Second, internationalization initially meant mainly Europeanization, as more and more European collaboration took place without considerable involvement of scholars from other world regions. Within the European context, however, intra-regional coauthorship between different CEE countries is atypical over the

period analyzed, which might indicate that CEE, as contrasted with other non-Western world regions such as Ibero-America (Demeter et al., 2022), does not have a shared regional academic culture in communication research, and thus the internationalization of the region has been governed by Western Europe and the United States. CEE countries connected to the international academic community through cooperation with Western countries, and did so individually, without the development of a shared CEE identity that would represent itself as a community on the international field.

Importantly, internationalization trends seem to have been changing over the past few years. The pace of internationalization is faster than ever before with a rapidly rising number of CEE papers with international collaboration and new international partners appearing in the region, mainly from emerging Asia. The foregoing shows that the importance of the so-called developing world (Lauf, 2005)—with growing interests in the globalization process of higher education and research (Dobbins & Kwiek, 2017)—is increasing. In MCS in 2020, SCImago reported that China, India, and Brazil were among the top ten publishers in terms of research output, while Japan, Korea, Iran, and South Africa were in the top 20.

Besides Russia, there is no other CEE country in the top 20. Therefore, international collaboration is very important for the region, and CEE scholars should consider other prolific countries beyond the Western world when looking at cooperation opportunities. This not only enhances the region's visibility but might also result in more diverse scholarship, which sees not only Western-Western and Western-Peripheral scholarship but also Peripheral-Peripheral collaborations.

To this end, CEE scholars and their institutions have to look beyond the Eurocentric world and seek to collaborate with African, Asian, Middle Eastern, and Latin American colleagues. To do so successfully, CEE might have to follow the path of Ibero-American MCS scholarship (Demeter et al., 2022) and try to develop a more coherent identity for CEE communication and media research with more frequent and fundamental collaborations between scholars in different parts of the region.

References

- Albuquerque, A., & Lycarião, D. (2018). Winds of change? BRICS as a perspective in international media research. *International Journal of Communication*, 12, 2873–2892.
- Demeter, M. (2018). The Global South's participation in the international community of communication scholars: From an Eastern European point of view. *Publishing Research Quarterly*, 34(2), 238–255. doi:10.1007/s12109-018-9585-0
- Demeter, M. (2019). The winner takes it all: International inequality in communication and media studies today. *Journalism and Mass Communication Quarterly*, 96(1), 37–59. doi:10.1177/1077699018792270
- Demeter, M. (2020). Kelet és nyugat között: A Tömegkommunikációs Kutatóintézet fénykora [Between the West and the East: The haydays of the Mass Communication Research Center in Hungary]. *JEL-KÉP: Kommunikáció Közvélemény Média*, 9(3), 28–34. doi:10.20520/Jel-Kep.2020.3.29

- Demeter, M., Goyanes, M., Navarro, F., Mihalik, J., & Mellado, C. (2022). Rethinking De-Westernization in communication studies: The Ibero-American movement in international publishing. *International Journal of Communication*, 16, 3027–3046.
- Dobbins, M. (2011). *Higher education policies in Central and Eastern Europe*. London, UK: Palgrave Macmillan. doi:10.1057/9780230297494
- Dobbins, M., & Kwiek, M. (2017). Europeanisation and globalisation in higher education in Central and Eastern Europe: 25 years of changes revisited (1990–2015). *European Educational Research Journal*, 16(5), 519–528. doi:10.1177/1474904117728132
- Dobek-Ostrowska, B. (2015). 25 years after communism: Four models of media and politics in Central and Eastern Europe. In B. Dobek-Ostrowska & M. Głowacki (Eds.), *Democracy and media in Central and Eastern Europe 25 years on* (pp. 11–46). Frankfurt am Main, Germany: Peter Lang.
- Fatt, C., Ujum, E., & Ratnavelu, K. (2010). The structure of collaboration in the Journal of Finance. *Scientometrics*, 85(3), 849–860. doi:10.1007/s11192-010-0254-0
- Goyanez, M., & Demeter, M. (2020). How the geographic diversity of editorial boards affects what is published in JCR-ranked communication journals. *Journalism and Mass Communication Quarterly*, 97(4), 1123–1148. doi:10.1177/1077699020904169
- Grbeša, M., & Bebić, D. (2021). Political communication in Croatia: Critical assessment of the field. In M. Minielli, M. N. Lukacovic, S. A. Samoilenko, M. R. Finch, & D. Uecker (Eds.), *Media and public relations research in post-socialist societies* (pp. 59–76). Lanham, MD: Lexington Books.
- Gulyás, A. (2006). Quelques problèmes de traduction du registre populaire français en langage hongroise [Some problems of translation of the French popular register into Hungarian language]. *Verbum: Analecta Neolatin*, 8(2), 453–462. doi:10.1556/Verb.8.2006.2.15
- Gulyás, A. (2011). Traduire Rabelais: Choix et dilemmes [Translating Rabelais: Choices and dilemmas]. *Hungarian Studies: A Journal of the International Association for Hungarian Studies and Balassi Institute*, 25(1), 37–44. doi:10.1556/HStud.25.2011.1.3
- Gulyás, A. (2019). How do new languages arise? A comparison of romanization and gallicization. *Acta Antiqua Academiae Scientiarum Hungaricae*, 59(1), 1–4. doi:10.1556/068.2019.59.1-4.3
- Gulyás, A. (2020). Traduire la transgression verbale [Translate the verbal transgression]. *Revue D'études Françaises*, 24(1), 167–175. doi:10.37587/ref.2020.1.13
- Háló, G. (2022). A review of online communication research in Hungary. *Online Media and Global Communication*, 1(1), 1–27. doi:10.1515/omgc-2022-0026
- Harro-Loit, H. (2015). Revisiting national journalism cultures in post-communist countries: The influence of academic scholarship. *Media and Communication*, 3(4), 5–14. doi:10.17645/mac.v3i4.387

- Hicks, D. J., Coil, D. A., Stahmer, C. G., & Eisen, J. A. (2019). Network analysis to evaluate the impact of research funding on research community consolidation. *PLoS ONE*, *14*(6), e0218273. doi:10.1371/journal.pone.0218273
- Jacomy, M., Venturini, T., Heymann, S., & Bastian, M. (2014). ForceAtlas2, a continuous graph layout algorithm for handy network visualization designed for the Gephi software. *PLoS ONE*, *9*(6), e98679. doi:10.1371/journal.pone.0098679
- Jiráček, J., & Köpplová, B. (2008). Communication as an academic field: Eastern Europe and Russia. In W. Donsbach (Ed.), *The international encyclopedia of communication* (pp. 609–614). Hoboken, NJ: John Wiley & Sons, Ltd. doi:10.1002/9781405186407.wbiecc060
- Kamada, T., & Kawai, S. (1989). An algorithm for drawing general undirected graphs. *Information Processing Letters*, *31*(1), 7–15. doi:10.1016/0020-0190(89)90102-6
- Lauf, E. (2005). National diversity of major international journals in the field of communication. *Journal of Communication*, *55*(1), 139–151. doi:10.1111/j.1460-2466.2005.tb02663.x
- Lauk, E. (2015). A view from the inside: The dawning of De-Westernization of CEE media and communication research? *Media and Communication*, *3*(4), 1–4. doi:10.17645/mac.v3i4.545
- Lauk, E., & Barczyszyn-Madziarz, P. (2019). CEE media and communication research on the global map. *Central European Journal of Communication*, *12*(1), 111–115. doi:10.19195/1899-5101.12.1(22).7
- Mellado, C. (2012). Major trends of journalist studies in Latin America: A meta-analysis of five decades of research. In D. H. Weaver & L. Willnat (Eds.), *The global journalist in the 21st century* (pp. 413–425). New York, NY: Routledge.
- Miike, Y. (2014). The Asiatic turn in Asian communication studies: Shifting paradigms and changing perspectives. In M. K. Asante, Y. Miike, & J. Yin (Eds.), *The global intercultural communication reader* (pp. 111–133). New York, NY: Routledge.
- Minielli, M. C., Finch, M. R., Lukacovic, M. N., Samoilenko, S. A., & Uecker, D. (Eds.). (2021). *Media and public relations research in post-socialist societies*. Lanham, MD: Lexington Books.
- Newman, M. E. (2005). A measure of betweenness centrality based on random walks. *Social Networks*, *27*(1), 39–54. doi:10.1016/j.socnet.2004.11.009
- Olmeda-Gómez, C., Perianes-Rodríguez, A., Ovalle-Perandones, M. A., & De-Moya-Anegón, F. (2008). Comparative analysis of university-government enterprise co-authorship networks in three scientific domains in the region of Madrid. *Information Research*, *13*(3), Paper No. 352.
- Pálné Kovács, I., & Kutsar, D. (2014). *Internationalisation of social sciences in Central and Eastern Europe: The "catching up"—A myth or a strategy?* New York, NY: Routledge.

- Park, D. W., & Pooley, J. (2008). *The history of media and communication research: Contested memories*. New York, NY: Peter Lang.
- Park, M.-J., & Curran, J. (Eds.). (2000). *De-Westernizing media studies*. New York, NY: Routledge.
- Perez, L. A. (1990). Dependency. *Journal of American History*, 77(1), 133–142. doi:10.2307/2078645
- Peruško, Z., & Vozab, D. (2016). The field of communication in Croatia: Toward a comparative history of communication studies in Central and Eastern Europe. In P. Simonson & D. W. Park (Eds.), *The international history of communication study* (pp. 231–252). London, UK: Routledge.
- Peruško, Z., & Vozab, D. (2017). Socialist and post-socialist communication research: A longitudinal analysis. *Zeszyty Prasoznawcze*, 60(2), 361–381. doi:10.4467/22996362PZ.17.023.7303
- Pisarek, W. (2014). Interview—Polish media studies between past and future: The role of the Press Research Centre (OBP) in Cracow. *Central European Journal of Communication*, 7(1), 136–150.
- Preston, P., Arnold, K., & Kinnebrock, S. (2020). *The handbook of European communication history*. New York, NY: Wiley-Blackwell.
- Reiter, B. (2018). *Pluriverse: The geopolitics of knowledge*. Durham, NC: Duke University Press.
- Schoen, M. W., Moreland-Russell, S., Prewitt, K., & Carothers, B. J. (2014). Social network analysis of public health programs to measure partnership. *Social Science & Medicine*, 123, 90–95. doi:10.1016/j.socscimed.2014.10.057
- Segado-Boj, F., Gómez-García, S., & Díaz-Campo, J. (2022). Intellectual and thematic structure of Communication research in Scopus (1980–2020): A comparative perspective among Spain, Europe, and Latin America. *Profesional de la Información*, 31(1), e310110. doi:10.3145/epi.2022.ene.10
- Simonson, P., & Park, D. W. (Eds.). (2016). *The international history of communication study*. New York, NY: Routledge.
- Sosa, M. E., Eppinger, S. D., & Rowles, C. M. (2007). A network approach to define modularity of components in complex products. *Journal of Mechanical Design*, 129(11), 1118–1129. doi:10.1115/1.2771182
- Splichal, S. (1989). Indigenization versus ideologization: Communication science on the periphery. *European Journal of Communication*, 4(3), 329–359. doi:10.1177/026732318900400300
- Splichal, S., & Mance, B. (2018). Paradigm(s) lost? Islands of critical media research in communication journals. *Journal of Communication*, 68(2), 399–414. doi:10.1093/joc/jqx018

- Štetka, V. (2015, June). *Stepping out of the shadow: Internationalizing communication research in CEE*. Paper presented at the 8th International Central and East European Media Conference, Zagreb, Croatia.
- Szabó, G. (2021). Communication and media studies in Hungary (1990–2020). In M. C. Minielli, M. R. Finch, M. N. Lukacovic, S. A. Samoilenko, & D. Uecker (Eds.), *Media and public relations research in post-socialist societies* (pp. 97–116). Lanham, MD: Lexington Books.
- Tarasheva, E. (2011). The place of Eastern European researchers in international discourse: Critical discourse analysis applied to corpora from specialized journals. *Discourse & Society*, 22(2), 190–208. doi:10.1177/0957926510392129
- Thussu, D. K. (Ed.). (2009). *Internationalizing media studies*. New York, NY: Routledge.
- Tóth, J. (2018). U.S. journals can afford to remain regional, but we can not: Author distribution-based internationality of Eastern European communication journals. *KOME—An International Journal of Pure Communication Inquiry*, 6(2), 1–15. doi:10.17646/KOME.2018.21
- Vartanova, E., & Dunas, D. (2021). Russian media studies in transition. In M. Minielli, M. N. Lukacovic, S. A. Samoilenko, M. R. Finch, & D. Uecker (Eds.), *Media and public relations research in post-socialist societies* (pp. 145–160). Lanham, MD: Lexington Books.
- Vihalemm, P. (2001). Development of media research in Estonia. *Nordicom Review*, 22(2), 79–92. doi:10.1515/nor-2017-0357
- Waisbord, S. (2019). *Communication: A post-discipline*. London, UK: Polity.
- Waisbord, S., & Mellado, C. (2014). De-Westernizing communication studies: A reassessment. *Communication Theory*, 24(4), 361–372. doi:10.1111/comt.12044
- Watts, D. J. (1999). Networks, dynamics, and the small-world phenomenon. *American Journal of Sociology*, 105(2), 493–527. doi:10.1086/210318
- Xu, X., Oancea, A., & Rose, H. (2021). The impacts of incentives for international publications on research cultures in Chinese humanities and social sciences. *Minerva*, 59, 469–492. doi:10.1007/s11024-021-09441-w
- Xu, X., Střelcová, A. B., Marini, G., Huang, F., & Cai, Y. (2022). International academics in mainland China: What do we know and what do we need to know? *European Journal of Higher Education*, 12(1), 416–433. doi:10.1080/21568235.2022.2074865
- Yan, E., Ding, Y., & Zhu, Q. (2010). Mapping library and information science in China: A coauthorship network analysis. *Scientometrics*, 83(1), 115–131. doi:10.1007/s11192-009-0027-9
- Zhu, W., & Guan, J. (2013). A bibliometric study of service innovation research: Based on complex network analysis. *Scientometrics*, 94(3), 1195–1216. doi:10.1007/s11192-012-0888-1