

RESEARCH COOPERATION NETWORK ANALYSIS IN THE PUBLIC ADMINISTRATION DOMAIN*

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* **Acknowledgment:** This work was supported by the National Social Science Foundation of China (Project No. 22BGL248). The authors are grateful to Professors Feng-Chun Fan and Zhi-Qiang Xia. The authors would also like to thank anonymous reviewers for their valuable comments.

Abstract

We construct scientific research cooperation networks in the field of public management to provide empirical support for exploring the trend in cooperation in the public administration domain. Based on the SSCI database, the co-authored papers in the field of public administration from 1921 to 2022 are selected as data sources. Ucient software is used to visualize the cooperation networks of countries, cities, institutions, and authors in public administration research, and to explore the spatial structure and driving factors of cooperation networks at different levels. The country-level cooperation in public administration research is closely related to geographical location and is affected by regional agreements to some extent. London and Washington are located at the center of the global public administration cooperation network, and the city-level cooperation network is affected by south-north differentiation and the east-west gap in global economic development and thus exhibits significant non-equilibrium. The institutions in the United Kingdom, America, and Canada are the main forces of international cooperation in the field of public administration and accordingly occupy a dominant position in cooperation networks. The authors' collaboration network in the public administration research shows strong centrality.

Keywords: public administration, international cooperation, network analysis, visualization, literature measures.

1. Introduction

Public administration is the study of the management, function, and operation of government agencies and organizations in the public sector (Van Thiel, 2014). Based on its characteristic of being an intersection of multiple disciplines, Shafritz *et al.* (2016) clustered public administration into four categories – managerial, legal, political, and occupational – which expanded upon the three pillars of public administration established by David H. Rosenbloom. Meanwhile, it is its interdisciplinary and multifield nature that endows it with pluralistic values, which has inspired a long-running debate in academia. Traditional public administration rose in the United States in the early 1900s. In the 1960s and 1970s, the rise of the new public administration movement added the basic goal of social equity to the public administration domain (Holzer and Schwester, 2006). Since then, public administration has had dual values of efficiency and democracy. The emergence of public value is not intended to replace the economic perspective, but rather a comprehensive consideration of the local situation and human values – under the larger background of ‘modernity’ and deepening ‘moral commonwealth’ – to reflect the positioning and values of public administration (Meynhardt, 2015). From a macro point of view, public administration can be regarded as comprising all actions of the government, including the management of public affairs and the implementation of public policies, which is its broadest and most universal interpretation (Shafritz *et al.*, 2016). At the micro level, public administration is derived from behavioral public administration (BPA) and focuses on micro-behavioral processes in the context of public service – that is, how to develop preferences and make choices.

From a developmental perspective, contemporary public administration is undergoing a global transformation. With the development of new approaches to public management, public services, governance networks, and other reforms, it has become more complex and multifunctional. In this protean context, simple instrumental rationality can be supplemented by institutional approaches, and the government should therefore propose cost-effective solutions to better address major challenges such as globalization, climate warming, an aging population, national security, and infectious diseases (Christensen and Lægreid, 2018). As mentioned earlier, globalization has had a profound impact on public administration. Globalization, which has been fueled by global financialization, the accumulation of economic surplus, the growth of transnational corporations, and the heightening of human expectations, will inevitably lead to the emergence of supranational management institutions, which are complementary to or will even replace the role of the nation-state, thereby eroding local consciousness and urban power structures to a certain extent and deepening the dependence of underdeveloped countries, aggravating their financial crises, and causing serious governance problems and challenges to public administration within the country. In addition, globalization calls for concepts such as openness, peace, poverty eradication, global thinking, and superpower cooperation, which also provides opportunities for sustained innovation in public administration. Based on this condition, it is both possible and appropriate to systematically rewrite a country’s trade, fiscal, medical security,

public services, environmental, and resettlement policies (Farazmand, 1999). Obviously, with the expansion of time, perspective, and scope, public administration is constantly developing and maturing to adapt to a changing modern society and should therefore be viewed from a changing and pluralistic perspective to avoid stagnation.

Public administration has always been focused on law and constitution, organization and management, and state and political issues that involve efficiency, performance, accountability, governance, and many other hot topics (Farazmand, 2012). The urgent task of public administration is to achieve efficiency at all levels to provide satisfactory public goods and services to countries' citizens (Manzoor, 2014). Efficiency has always been at the core of the public administration debate, in large part, the progressive movement is a response to low public efficiency. The appeal of traditional public administration to enhance efficiency confirms the rise of bureaucratic institutions, the centralization of public functioning, and the rationalization of administrative budgeting (Grandy, 2009). It is widely acknowledged that the system of government directly determines the degree of well-being for the inhabitants of a country. Better organizational characteristics and the use of management technology create efficiencies, which can allow for social and economic development. With the advancement of modern society, the importance of public administrative efficiency in macroeconomics and social development has become increasingly prominent. The public sector, like the private sector, must accelerate the search for ways to improve administrative efficiency (Buleca and Mura, 2014). As an innovative application of the government, the accountability system can play a positive role in providing incentives and improving efficiency under the premise of ensuring transparency and justice (Han, 2020). The accountability mechanism based on performance reviews stimulates political effectiveness through comparison and competition, which is crucial to stabilizing and enhancing the trust between citizens and the government (Johansson and Montin, 2014). In fact, the implementation of public policies and the operation of the public sector increasingly require cooperation between public and private actors. In recent years, there has been a rising trend in academic research on partnerships. Among them, public-private partnerships (PPPs) are the most representative and have become a popular tool for delivering infrastructure and public services around the world. PPPs are defined as a cooperative institutional arrangement between the public and private sectors (Hodge and Greve, 2007). Moreover, 'new public governance' has become a new paradigm of public administration that not only provides a new framework for theoretical research, but also provides a new practical model for the management of public affairs and thus indicates the development of globalization, networking, and diversification in public administration (Runya *et al.*, 2015).

At present, the technological revolution is urging the continuous innovation of public administration. Waves of technology, such as the Internet of Things, big data, blockchain, and artificial intelligence, are profoundly reshaping public administration (Agarwal, 2018). The digitization of human life and the IT technology applied to the public sector have brought remarkable positive results to public administration in terms of efficiency,

effectiveness, and customer satisfaction, such as improving the accuracy of decision-making, accelerating the speed of policy implementation, and reducing the cost of organizational operations (Maciejewski, 2017). E-government is a typical example of public management innovation in the digital age, however, while improving public services and administrative efficiency, e-government will also magnify the existing problems in the public sector, such as the dilemma of cooperative governance (Lavertu, 2016). Government data collection activities are often dispersed. Specifically, public institutions often operate in isolation in their information technology ecosystems, and the interaction between trans-departmental intelligence systems is limited. The resulting phenomena of data fragmentation and data islands result in higher requirements for collaborative governance in the public sector (Desouza and Jacob, 2017). Consequently, how to successfully deal with the social changes brought about by big data in the field of public affairs has become the focus of public administrators. Whether the debate is about efficiency, performance, governance, or e-government, it is the embodiment of academia catching up with the practices of the global public sector. Public administration reformers are therefore expected to explore and respond to these complex realities more carefully and directly.

2. Theoretical analysis based on ecosystem and Matthew effect

2.1. Operational framework of scientific research cooperation network based on ecosystem theory

In 1935, British plant ecologist Tansley proposed the concept of ‘ecosystem’, he emphasized that any community in nature does not exist in isolation, but rather forms a unified whole through interaction and interdependence with its environment (Tansley, 1935). Afterwards, the psychologist Urie Bronfenbrenner proposed Ecosystem Theory from the perspective of developmental psychology. He emphasized that behavioral individuals are nested within a series of interacting environmental systems. The system is divided into four levels, from the inside out, which are: (1) Microsystem, representing the direct environment of individual activities and interactions; (2) Mesosystem, referring to the connection or relationship between various Microsystems; (3) Exosystem, which is a system in which the individual is not directly involved but has an influence on its development; (4) Macrosystem, which is the cultural, subcultural and social environment that affects the above three systems. This theoretical system explores the interaction between human behavior development and the environment, emphasizing that it is a constantly changing and developing dynamic process, and expanding the concept of ‘environment’ to extend to social and cultural environments. In the practice of academic exchange, the scientific research cooperation network is a system that covers cooperative subjects, influencing factors and stakeholders, and is an ecological system in which cooperative behavior interacts with multi-layer environment and develops dynamically. From the perspective of researchers, conducting scientific research cooperation is driven by both self-research

needs and the current research environment and social development needs. The cooperation team and their organization also play a role in the development of cooperative behavior, which is consistent with the connotation of ecosystem theory.

The operating ecosystem of scientific research cooperation network not only integrates and presents the system level composed of cooperative subjects, influencing factors and stakeholders, but also reveals the interaction relationship. The correlation between subsystems are as follows:

(1) The influence of Macrosystem on Exosystem, Mesosystem and Microsystem

Scientific research cooperation is often problem-oriented and demand-driven, while the Macrosystem reflects the role of culture, subculture, and social environment on human behavior development. Therefore, the Macrosystem represented by social development needs and the change of scientific research environment has a driving effect on scientific research cooperation practice by external supporters, cooperative networks, and individual researchers from the external environment level. For example, after 2000, with the acceleration of globalization, decentralization, and marketization, both developed and developing countries are seeking governance tools and reform measures to adapt to this complex environment. In such a cultural environment, research cooperation institutions have gradually emerged, forming spaces and platforms to promote cooperation, enhancing the value identification of researchers. Research in the field of public administration has increased significantly.

(2) The influence of the Exosystem on the Mesosystem and the Microsystem

Scientific research cooperation is a kind of scientific research behavior, which needs to be analyzed in a specific scientific community. The Exosystem represented by relevant policies, research funding, disciplinary system, and other factors has a driving effect on the formation and development of cooperation networks and individual research cooperation behavior. For example, the closer the geographical location, the more similar the culture, the more frequent the contact and cooperation between individual researchers, so that countries (regions) within the same geographical range are mostly in the same cluster.

(3) The mutual influence between Mesosystem and Microsystem

The elements covered by a microsystem directly interact with individual activities, while individuals are embedded in cooperative networks and interactions between microsystems of different individuals. Research cooperation occurs in the interaction process of research individuals. The more positive the individual elements involved in scientific research cooperation, the more positively it can affect the elements of the cooperation network. Thus, this situation maintains the development of the scientific research cooperation team, and the healthy development of teams also strengthens individual willingness and behavioral attitudes towards cooperation. In the relationship of mutual trust and harmonious cooperation atmosphere, the partners are more actively involved and promote the progress of cooperation.

2.2. Theoretical analysis of scientific research cooperation network based on the Matthew effect

American scholar Robert K. Merton put forward the famous Matthew effect theory in 1968. He pointed out that scholars who have been highly recognized by the academic community tend to get more honors and recognition, while relatively unknown scholars often get less honors and recognition than their research contributions.

The Matthew effect mainly reflects a type of advantageous accumulation, which can not only show in individual level, but also reflects the characteristics of resource accumulation in organizations or regions (Yuan and Wu, 2011). For example, as the birthplace of public management, the United States has leading advantages and a large number of cutting-edge scientific research institutions in this field, and its research strength and academic discourse power are far ahead. At the same time, the higher the level of economic development of a city, the higher the corresponding supply of scientific research and innovation resources are, and it leads to significant centrality and imbalance in the cooperative research of public administration at the city level. This also makes the cooperative network among the authors of public administration research show a strong central pattern.

3. Methodology

In the era of the knowledge economy, in which globalization of scientific activities is becoming increasingly prominent, international cooperation has become the norm in scientific research. Cutting-edge knowledge spreads around the world through cooperation and culminates in a global scientific research cooperation network with highly internalized characteristics. Scientific research cooperation networks refer to the cooperation links established by researchers from different countries (regions), cities, and institutions to carry out scientific research or solve scientific problems. The current study focuses on the influence of geographical distance, cognition, cultural foundations, historical relationships, and other factors on the structural characteristics of networks and seeks to study the formation mechanisms and evolution of cooperative networks. At present, there is little research on scientific cooperation networks in the field of public administration. Based on the Social Science Citation Index (SSCI) database, this paper constructs the cooperation networks of countries (regions), cities, institutions, and authors in the field of public administration and describes their geographical patterns from the macro, meso, and micro perspectives. Social network analysis provides a powerful tool for cooperation network research. This research uses VOSviewer software to visualize cooperation networks. The network scale is measured by nodes and edges. Nodes represent countries, cities, institutions, or authors; edges reflect the number of paper collaborations among the subjects. Density and centrality characterize the density and aggregation of the entire network.

As a direct manifestation of cooperation among researchers in different regions or organizations, co-authored papers are the most common measurement indicators for

studying cooperative network relationships due to the convenience of data acquisition. Co-authored papers are completed by researchers from at least two different countries (regions), cities, and institutions. Based on the cooperation data of scientific research papers in the field of public administration during 1921–2022, this research uses the scientometric and network analysis methods to discuss the structure and characteristics of cooperative networks in depth at the country, city, institution, and author levels.

Countries (regions) are the main research objects of cooperation networks. According to the SSCI database, a total of 74,760 papers in the field of public administration were produced worldwide during 1921–2022, covering 197 countries (regions). With the help of visualization methods, the cooperative behavior and research dynamics of countries (regions) can be comprehensively displayed from the network dimension, which is helpful to further analyze the endogenous structural characteristics and exogenous driving factors that affect the evolution of cooperation networks. City-level cooperation networks are an important presentation of the geographical pattern of scientific research that reflects the dominance and gateway status of cities in global scientific research. The spatial distribution of research collaborations in public management can be understood from the global network of urban cooperation. The 74,760 public administration studies included in this paper cover 88 cities around the world, and the resulting global public administration cooperation network can effectively reveal the spatial distribution of cooperation in public administration, highlight the hub function and gateway role of ‘super cities’, and further enrich the geographical dimension of the public administration research. As scientific cooperation communities, scientific research institutions are also the main research objects of cooperation network analysis. Based on the data of co-authored papers of SSCI, the public administration research cooperation network of 84 institutions around the world is constructed, and the inter-institutional cooperation and closeness are obtained. On this basis, the analysis of the characteristics and modes of cooperation between scientific research institutions can provide a theoretical foundation for the formation and development of relevant scientific research teams.

Scientific cooperation refers to scholars in related research fields cooperating for the purpose of knowledge accumulation. Author cooperation network analysis is an individual study of mutual cooperation from the micro level, which has a positive effect on revealing the authors’ scientific research tendencies. Taking the author and the number of co-authored papers as the research object, constructing the author cooperation network, and exploring the disciplines and scientific research tendencies are of great significance in tapping the potential and understanding the trends in factional cooperation in public administration.

4. Results and discussion

4.1. Country-level cooperation

Table 1 presents the time series and heat changes in publications in the field of public administration by country. The table covers 20 countries around the world, such as the United States, the United Kingdom, Canada, Australia, the Netherlands, Germany, and China, that are active in scientific research in the field of public administration. In terms of time span, it is divided into five time periods since the 1970s and takes each decade as a cycle. The United States, the United Kingdom, and Canada are far ahead in terms of the number of publications and are the three main producers of public administration research. Among them, the United States, as the birthplace of public administration, has the highest number of publications, with 14,072, or 62.9% more than the second largest (the United Kingdom). As far as the overall global trend is concerned, the discipline of public administration is still in a steady upward phase, with two important time nodes. First, in the 1990s, under the influence of government reforms such as decentralization, service outsourcing, and entrepreneurial innovation carried out by Western countries such as the United Kingdom and the United States, public administration developed to a new stage: new public management. To better guide the government administrative reform, improve the efficiency of national administration, and solve the practical problems faced

Table 1: Productive countries and their publications in the public administration domain

No.	Country	1970s	1980s	1990s	2000s	2010s	Active Degree	Total Publications
1	USA	127	133	912	4498	6695	12.46	14072
2	England	610	170	902	2916	3153	10.06	8639
3	Canada	310	180	436	1183	1522	9.99	4006
4	Australia	69	60	251	745	1378	12.30	2878
5	Netherlands	1	5	43	406	1338	19.07	2265
6	Germany	0	0	46	382	1063	22.16	1990
7	P.R. China	0	0	15	174	779	23.90	1318
8	Scotland	39	27	87	354	491	12.38	1147
9	Denmark	2	1	36	193	602	17.42	1062
10	Italy	3	1	15	130	568	25.96	967
11	Spain	0	0	4	147	612	18.76	933
12	Belgium	0	1	27	175	471	18.79	857
13	Sweden	5	2	23	156	442	21.92	821
14	South Korea	1	1	7	79	463	21.97	760
15	Wales	26	3	52	276	307	9.14	722
16	Norway	3	0	15	134	385	19.28	690
17	Switzerland	2	3	9	113	375	23.51	689
18	France	6	6	28	128	289	18.49	557
19	Israel	27	7	19	91	233	18.61	489
20	Turkey	1	0	2	76	324	15.97	457

Source: Authors' own contribution

by complex societies, the academic community has initiated a research boom in public management, and thus the number of publications in this field in various countries has increased significantly. Second, since 2000, with the acceleration of globalization, decentralization, and marketization, modern society has become increasingly uncertain. Both developed and developing countries are looking for means of governance and reform measures that are adaptable to such a complex environment, and constantly improve their national administrative capacity to obtain advantages in global economic competition and maintain high-quality sustained social growth. Against this backdrop, research in the field of public administration has risen significantly, with an unprecedented surge in the number of relevant publications worldwide.

The international cooperation network for public administration research based on VOSviewer is shown in Figure 1, which contains 59 country (region) nodes. The

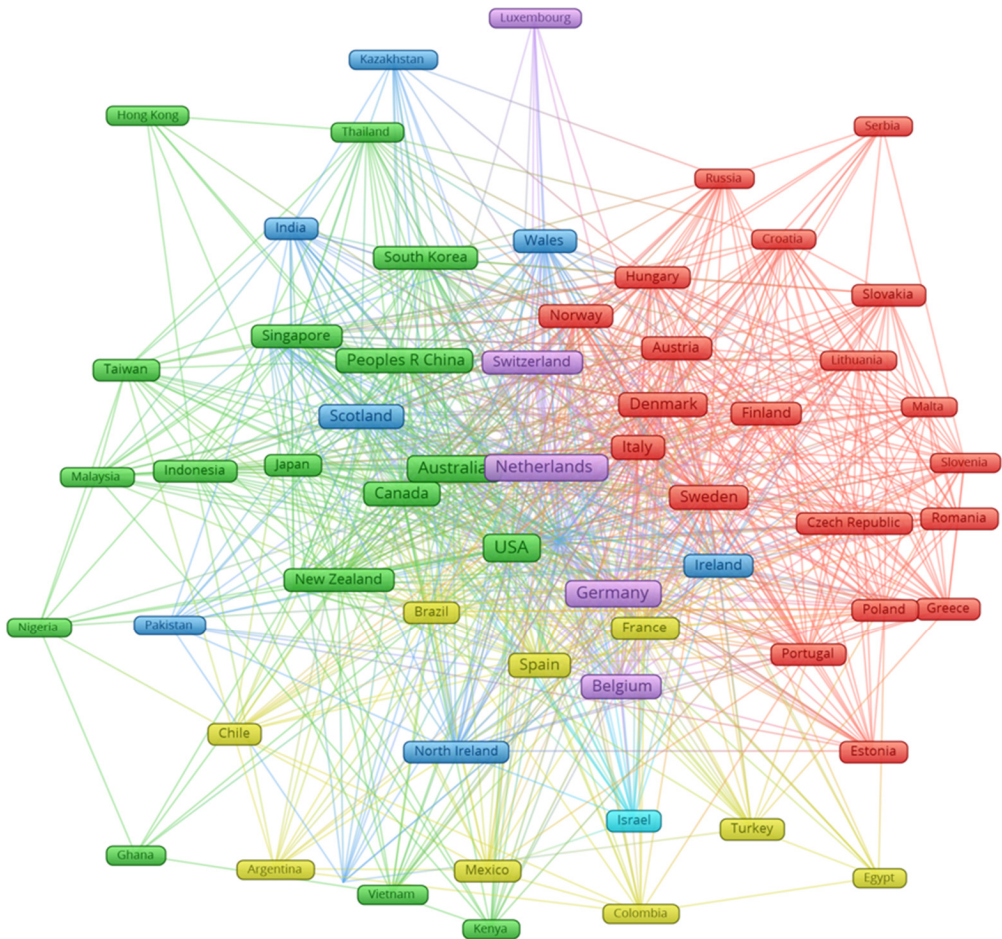


Figure 1: International cooperation network in the public administration domain

Source: Authors' own contribution

connections between nodes represent the collaboration between countries. According to the line distribution of connecting nodes in the figure, it can be seen that transnational scientific cooperation in the field of public administration is relatively close. Fifty-nine countries (regions) have formed five clusters that show strong regional characteristics. Cluster 1 mainly includes Pacific Rim countries (regions), such as the United States, Canada, Australia, New Zealand, Japan, China, etc.; cluster 2 mainly includes Western European countries, such as Italy, Denmark, Norway, Sweden, Austria, etc.; cluster 3 is dominated by Central European countries, represented by Switzerland and Germany; cluster 4 is dominated by countries around the Atlantic Ocean, involving Brazil, Mexico, Spain, France, etc.; cluster 5 is mainly concentrated in several countries (regions) in northern Europe, such as Ireland, Northern Ireland, Scotland, and Wales. At the same time, there is cooperation between countries (regions) in the subcluster network, such as Singapore and Norway, Nigeria and Chile, Colombia and Portugal, Russia and China, and Thailand and Wales. It can be seen that the degree of international cooperation of the 59 countries (regions) in the field of public administration research is closely related to geographical location: the closer the geographical location, the more frequent and intense the cooperation is. Countries (regions) in the same geographical range are mostly located in the same cluster. Due to the similar cultures, the connection is closer, which is convenient for resource integration and cooperation in scientific research. In addition, the structure of the country cooperation network for public administration research reflects the impact of regional development agreements on scientific cooperation. For example, in recent years, the European Commission has emphasized international scientific research cooperation and has successively issued the Science Europe Strategic Plan (2021–2026) and the Declaration on International Research and Innovation Cooperation, while the North American Free Trade Agreement has also formulated special policies for international scientific research cooperation, all of which have promoted the formation and development of academic cooperation networks in their respective regions to a certain extent.

4.2. City-level cooperation

Regarding city level cooperation, this paper focuses on the trends in public administration publishing since the 1970s and identifies 20 cities with high global public administration research popularity (see Table 2), including London, Washington, West Midlands, New York, Australian Capital Territory, New South Wales, etc. Corresponding to the national level, London and Washington, as the capitals of the United Kingdom and the United States, respectively, are the cities with the largest number of public administration publications (2,125 and 1,843 articles, respectively) and thus occupy a central position in the global public administration research, which is closely related to the level of urban economic development. Generally speaking, the higher the level of urban economic development, the higher the supply of scientific research and innovation resources will be. As they are among the fastest growing and most economically dynamic urban areas in Europe and North America, London and Washington have the highest scientific research investment

Table 2: Productive cities and their publications in the public administration domain

No.	City	1970s	1980s	1990s	2000s	2010s	Active Degree	Total Publications
1	London	181	33	155	631	837	12.19	2125
2	Washington	322	96	140	413	663	9.17	1843
3	West Midlands	5	32	140	483	387	7.22	1122
4	New York	124	28	55	231	384	10.43	930
5	Australian Capital Territory	9	15	53	199	383	14.34	760
6	New South Wales	0	20	67	180	357	13.04	736
7	Victoria	0	5	33	140	347	14.84	647
8	Lancaster	0	8	57	232	247	11.09	604
9	Seoul	1	1	3	68	367	19.83	595
10	Toronto, On.	0	0	26	184	291	15.63	576
11	Cambridge	48	34	47	129	238	11.70	564
12	Queensland	4	3	51	187	229	10.97	538
13	Avon	1	9	49	239	205	6.94	533
14	Oxford	43	4	31	147	203	16.19	525
15	Hong Kong	0	0	4	130	302	16.15	520
16	Ottawa, On.	0	0	42	152	225	17.62	505
17	Bloomington	41	12	27	123	253	9.74	503
18	Athens	23	19	23	156	218	6.11	475
19	Chicago	31	16	34	138	183	12.04	457
20	Los Angeles	60	24	30	128	164	9.91	454

Source: Authors' own contribution

and cutting-edge academic resources, and their academic output is naturally far ahead of that of other cities. In addition, the domestic political centrality of the two cities makes them more concerned about public management issues such as national governance, system selection, government reform, policy formulation, and the availability of public services and commitment to enhancing the administrative capacity to respond to emerging problems in domestic society. Therefore, their research scale and rankings in the field of public administration are also relatively higher.

The global city-level cooperation network in the public administration research is shown in Figure 2. Obviously, urban scientific research cooperation in the field of public administration shows the characteristics of globalization by forming four distinct clusters. Cluster 1 takes London as the core and mainly including cities such as West Midlands, Lancaster, and Milan; Cluster 2 is dominated by Washington and includes New York, Berkeley, Los Angeles, Hong Kong, Beijing, Seoul, and other cities; Cluster 3 mainly includes several cities in Canada and is represented by Toronto, Vancouver, Burnaby, Montreal, Hamilton, etc.; Cluster 4 is mainly concentrated in northern and western European cities, such as Utrecht, Amsterdam, Zurich, Aarhus, Berlin, Rotterdam, etc. In general, London and Washington, as 'super cities', are the core hubs of the global public administration cooperation network and have the highest number of transnational

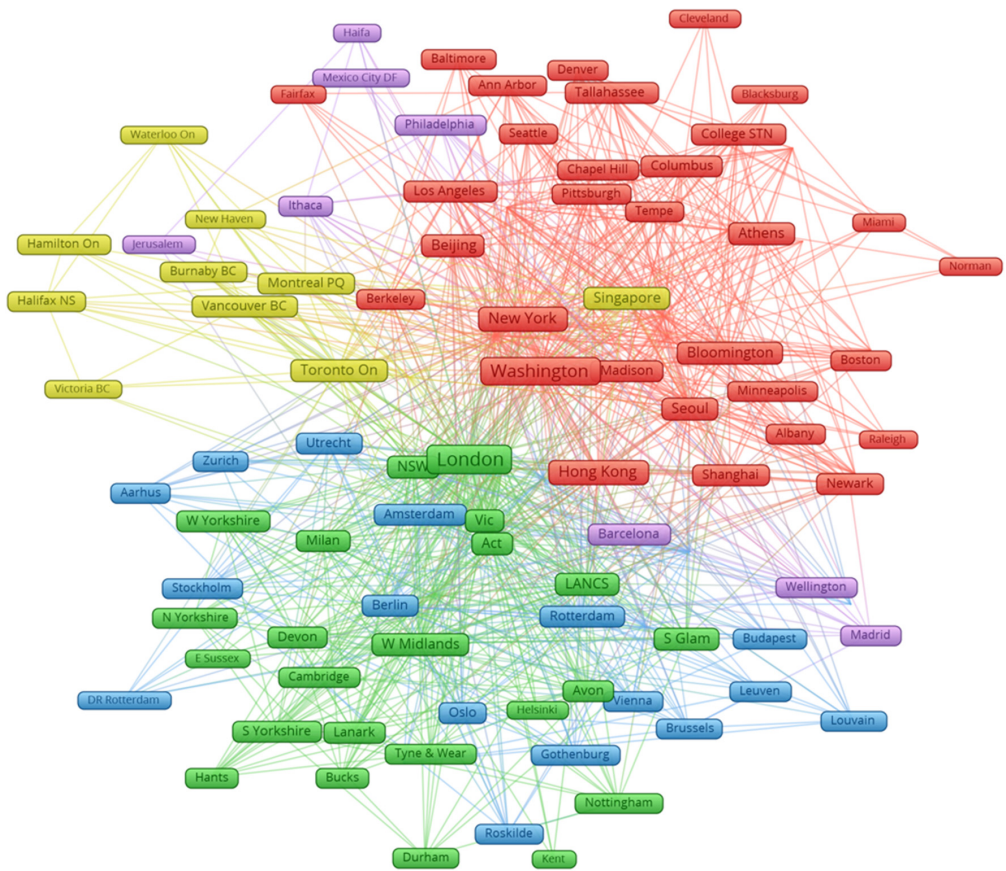


Figure 2: City-level cooperation network in the public administration domain

Source: Authors' own contribution

collaborations and the widest spatial coverage. The city-level cooperation in the public administration research shows significant centrality and disequilibria. The node size is proportional to the intensity of centrality, and the thickness of the edge is proportional to the intensity of inter-city cooperation. From the diagram, it can be seen that London and Washington are located in the center of the network. North America and Europe are the densest areas in the city-level cooperation network, and the city cooperation between Europe and the United States is also very close. Globally, there is a distribution pattern of dispersion and regional agglomeration because this spatial nonequilibrium is related to the level of global economic development and thus reflects south–north differentiation and the east–west gap. Specifically, cities in the global north generally have a higher number of nodes and greater connection strength in the network than cities in the global south. At the same time, the centrality of cities in developed countries is generally stronger than that of cities in developing countries. The overall proportion of European and American cities is higher, where international cooperation is closer.

4.3. Institutional-level cooperation

This study counts the top 20 scientific research institutions that have published the total number of public administration publications globally from the 1970s to the 2000s. It can be seen from Table 3 that the power distribution of scientific research institutions in public administration is concentrated in the United States and the United Kingdom. Among the top 20 scientific research institutions in terms of total publications, 15 institutions are located in the United States, accounting for 75% of all publications with a total of 2,620 articles published, followed by the United Kingdom, Canada, and Australia, which have 3 (10%), 1 (5%), and 1 (5%) scientific research institutions ranked in the top 20 of the total publications in the public administration research. According to the distribution of the main sources of publications, it can be seen that the United States, as the birthplace of public administration, has a leading advantage and a large number of frontier scientific research institutions in the field. The establishment of its research strength and academic discourse power has had a profound impact on the development of the public administration domain. Second, it is clear that universities are the dominant force in public administration research, and the top 20 institutions in the total number of related publications are universities from various countries. Among them, the University of Birmingham in the UK ranked first in terms of the number of papers published, with a total of 501 papers,

Table 3: Productive institutes and their publications in the public administration domain

No.	Institute	1970s	1980s	1990s	2000s	2010s	Total Publications
1	Univ. Birmingham	42	21	112	299	27	501
2	Texas A&M Univ.	29	12	34	132	16	223
3	Univ. of London, London Sch. of Econ. & Pol. Sci.	0	9	49	136	27	221
4	Univ. N. Carolina	29	26	36	89	34	214
5	Univ. Georgia	23	19	24	108	33	207
6	Univ. York	44	17	38	84	20	203
7	Indiana Univ.	44	12	30	95	21	202
8	Syracuse Univ.	36	22	32	89	21	200
9	Univ. Manchester	24	4	39	113	18	198
10	Univ. Toronto	16	23	22	109	21	191
11	Australian Natl. Univ.	9	10	28	104	40	191
12	Harvard Univ.	27	25	31	77	28	188
13	Univ. Washington	32	4	31	78	16	161
14	Univ. So. Calif.	42	19	20	55	18	154
15	Univ. Wisconsin	20	12	25	82	15	154
16	Univ. Michigan	22	10	31	59	25	147
17	Univ. Missouri	26	8	36	67	9	146
18	Univ. Illinois	27	13	19	71	15	145
19	Univ. Calif. Berkeley	13	22	27	61	17	140
20	Univ. Colorado	11	7	30	79	9	136

Source: Authors' own contribution

more than double that of Texas A&M University (223 papers), which ranked second, and was the most active scientific research institution from the 1970s to the 2000s, followed by the University of London, London School of Economics & Political Science (221 papers), the University of North Carolina (214 papers), the University of Georgia (207 papers), the University of York (203 papers), Indiana University (202 papers), and Syracuse University (200 papers).

From the perspective of time series, there are two important transition points in the evolution of the publication heat maps of scientific research institutions in the field of public administration. First, in the 1980s, western academia launched a reform movement called New Public Management, whose main content included reshaping the government, corporate reform, and managerialism and believed that it represented a new model that could replace that of traditional public administration. During this period, the research enthusiasm of academic institutions around the world in the field of public administration diminished, and the number of published papers generally showed a downward trend. Second, since the 2000s, with the in-depth advancement of the construction and reform of the discipline of public administration in universities, the output of public administration research in institutions around the world has grown rapidly. As far as the top three institutions are concerned, from the 1990s to the 2000s, the number of papers published by the University of Birmingham in the field of public administration increased from 112 to 299, for a growth rate of 166.96%. The number of papers published by Texas A&M University increased from 34 to 132, an increase of 288.24%. The number of articles published by the University of London, London School of Economics & Political Science rose from 49 to 136, an increase of 177.55%. Generally speaking, during this period, relevant scientific research institutions initiated a research boom in the field of public administration.

Figure 3 shows the cooperation network of major institutions. Research cooperation in the field of public administration involves abundant institutions, most of which are concentrated in Europe and North America and are widely distributed. Similar to the cooperative relationship between countries, the cooperative relationships among research institutions are also influenced by geography and form three main clusters. Cluster 1 involves well-known universities and research institutions in the UK, such as Oxford University, the University of Birmingham, the University of Nottingham, etc. Cluster 2 mainly includes Harvard University, Columbia University, Cornell University, George Washington University, the University of Georgia, the University of Michigan, and other American universities. Cluster 3 mainly contains Canadian universities, including McMaster University, the University of Ottawa, the University of Montreal, the University of Calgary, etc., with the University of Toronto at the core. Generally, institutions in countries and regions such as the United Kingdom, the United States, and Canada are the main forces for international cooperation in public administration research.

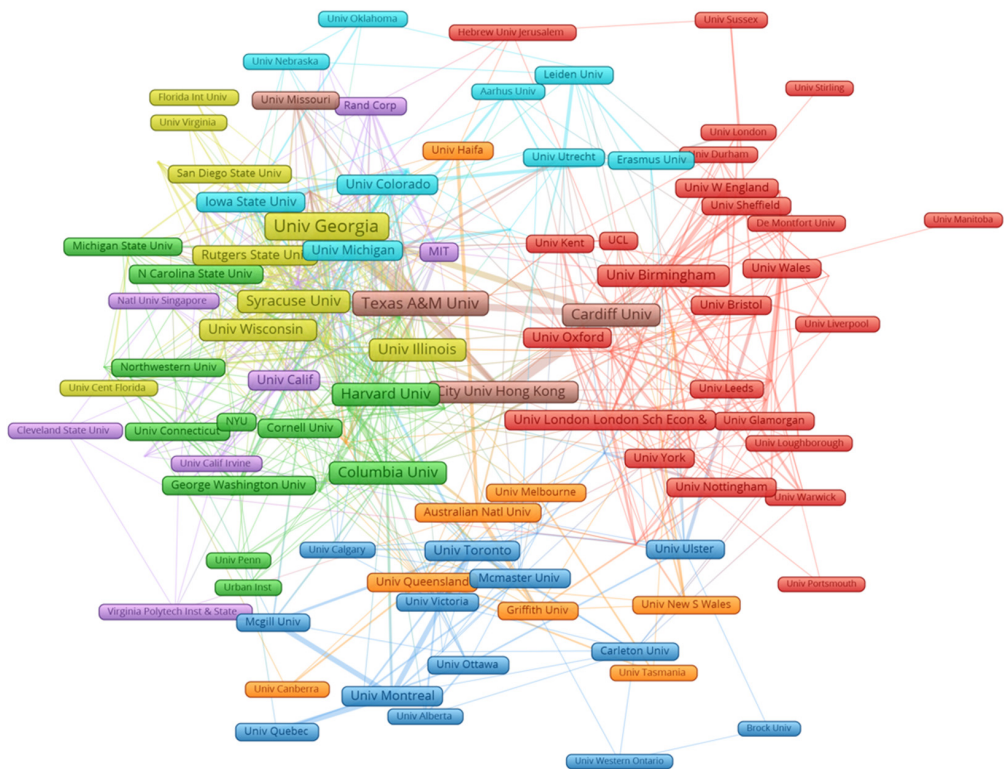


Figure 3: Institutional cooperation network in the public administration domain

4.4. Personal-level cooperation

Table 4 shows the number and heat map changes for 20 public administration scholars in different time series. It can be seen from the number of articles that Meier K.J. ranks first on the list, thus indicating that he has published the most articles in the field of public administration since the 1970s to the present, with a total of 125 articles. He is followed by Stewart J., Pollitt C., and Coulson A., with 117, 102, and 92 publications, respectively, ranking second, third and fourth. The 5th and 6th largest numbers of papers are by Rosenbloom D.H. and Howlett M., both of which have 88 contributions each.

The cooperation network between authors in the public administration research shows a strong centrality pattern in Figure 4. Walker R.M., Boyne G.A., Andrews R., Meier K.J., and O'Toole L.J. are located at the center of the network, thus indicating that they have a significant impact on the development of the discipline, have made significant research contributions, and are core collaborators in the public administration research. They represent the backbone of public administration research, and clusters of authors in the network exist around them. The research of these scholars has laid the foundation for public administration and is closely related to that of other scholars. In addition, the authors' cooperation network forms five clusters. Cluster 1 is led by Walker R.M., and includes

Table 4: Productive authors and their publications in the public administration domain

No.	Author	1970s	1980s	1990s	2000s	2010s	Active Degree	Total Publications
1	Meier, K.J.	4	8	8	44	44	12.80	125
2	Stewart, J.	2	22	59	23	10	0.85	117
3	Pollitt, C.	3	37	15	19	28	0.00	102
4	Coulson, A.	0	18	46	24	4	0.00	92
5	Rosenbloom, D.H.	7	14	19	16	26	6.82	88
6	Howlett, M.	0	2	10	11	51	17.05	88
7	Leach, S.	2	21	36	21	7	0.00	87
8	Perry, J.L.	9	13	2	16	42	4.71	85
9	Walker, R.M.	0	0	0	35	41	11.76	85
10	Moynihan, D.P.	0	0	0	34	41	4.94	81
11	Andrews, R.	0	0	0	19	51	12.99	77
12	Bozeman, B.	11	10	9	18	25	7.89	76
13	Rhodes, A.W.R.	3	15	24	20	7	1.39	72
14	Hood, C.	6	12	15	19	17	2.82	71
15	Powell, M.	1	0	12	28	20	10.00	70
16	Kim, S.	0	0	2	12	41	15.71	70
17	Boyne, G.A.	0	6	9	33	20	0.00	68
18	Peters, B.G.	4	5	10	12	30	13.64	66
19	Lynn, L.E.	0	10	18	31	7	0.00	66
20	Roberts, A.	0	0	11	21	28	10.77	65

Source: Authors' own contribution

Moon M.J., Delcan P., Grassi G., and others; Cluster 2 consists of scholars Leach S., Skeicher C., Sullivan H., Newman J., Wilson D., and others; Cluster 3 includes Laegreid P., Christensen T., Hood C., Lodge M., and Dunsire A.; Cluster 4 is centered around scholar Wright B.E. and includes Andersen I.H., Femandez S., Brudney J.L., Bozeman B., Rainey H.G., and others; Cluster 5 consists of Kapucu N., Sukkim P., Pollitt C., Roberts A., Edelenbos J., Taylor J., Wang X.H., Kim S., and Park S.

5. Conclusions

Based on the perspective of scientific research cooperation networks, this paper constructs a public administration cooperation network at the country, city, institution, and author levels. By analyzing the spatial structure and characteristics of holistic, partial, and individual cooperation networks in the public administration research, four driving factors are found – geographical distance, economic development level, regional agreement, and cognitive proximity – which enriches the theoretical perspective of cooperation in the field of public management.

Geographical distance is the primary factor in the formation of cooperation networks. Geographical proximity can facilitate the flow of knowledge and academic exchange within the region and promote the formation of cooperation networks. From the perspective

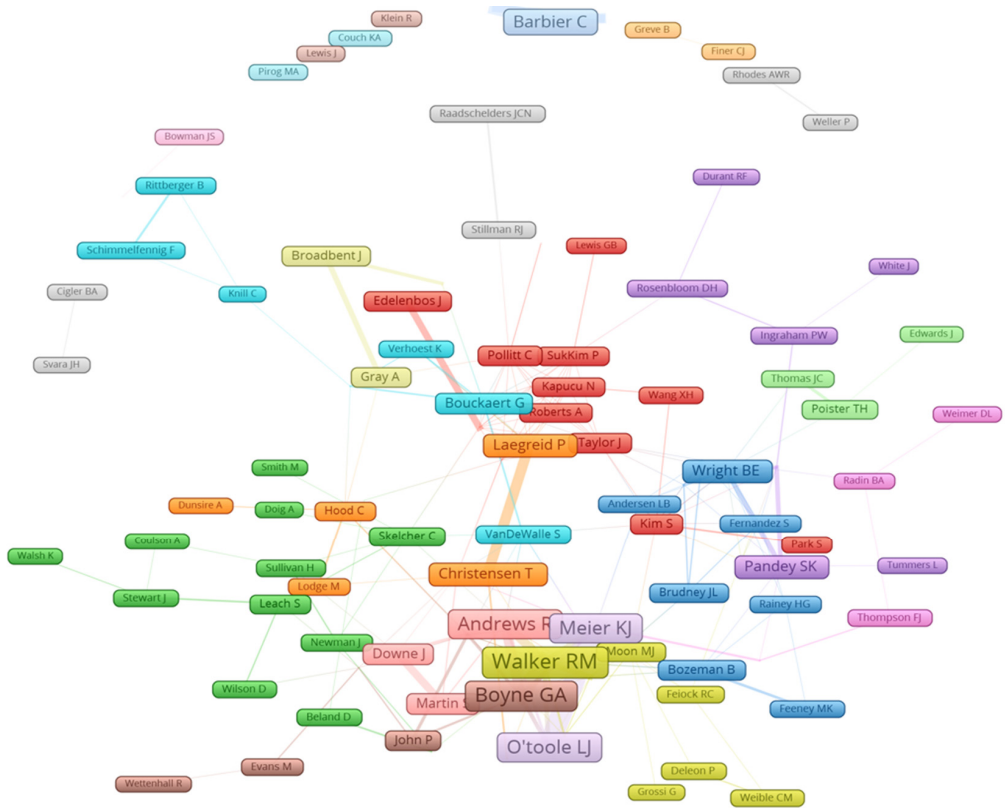


Figure 4: Individual cooperation network in the public administration domain

Source: Authors' own contribution

of spatial distribution, the cooperation of public administration scientific research is inversely proportional to geographical distance, and the local cooperation network shows strong regionalism. Specifically, the cooperative links in the global public administration research are mainly in geographically neighboring countries and form five cohesive sub-groups distributed in the Pacific Rim, Western Europe, Central Europe, Atlantic Rim, and Northern Europe. There is relatively little long-distance international cooperation, which shows that the cooperative subjects tend to find neighboring scientific research partners to reduce the temporal and spatial costs of knowledge circulation.

The level of economic development has a key impact on global scientific research cooperation. The development of the urban economy strongly supports scientific research cooperation, and the progress of modern civilization will promote the development of science and culture. Developed countries, especially those with a high level of industrialization, have a higher demand for scientific research and technological innovation and attach more importance to international scientific research cooperation. A typical example is embodied in urban cooperation networks in public administration research. The number of nodes and the connection strength of cities located in the North are generally higher than those

of cities in the South, and cities in developed countries in Europe and the United States are generally more centralized than those in developing countries in the cooperation network.

A regional agreement is a form of cooperative behavior between subjects with potential cooperation intentions based on common goals such as the economic development and social maintenance of the region. Countries (regions) or cities can promote institutional integration by signing cooperation agreements or common treaties, thereby mitigating the adverse impact of institutional gaps on the international or inter-city socio-economic exchange, which can facilitate the development of regional scientific research cooperation to a certain extent. The structure of the public administration cooperation network research intuitively reflects the positive impact of regional agreements on scientific research cooperation. The European Commission and the North American Free Trade Agreement (NAFTA) have both formulated special policies for international scientific research cooperation, and their member states have formed highly consistent cooperation clusters in their respective regions.

In general, this study explores the scientific research cooperation and spatial distribution in the field of public administration from the macro, meso, and micro perspectives and comprehensively clarifies the network structure characteristics and driving mechanisms of public administration cooperation, which is conducive to understanding the multidimensionality and complexity of cooperation networks in time and space. However, this paper only discusses the static structure of public administration research cooperation networks and thus does not examine the structural evolution and driving mechanisms of cooperative networks from the time series dimension. In future research, on the one hand, the scope of research can be expanded to further explore the diachronic evolution of public administration research cooperation networks and reveal their dynamic spatial pattern and spatiotemporal evolution characteristics. On the other hand, it is possible to broaden the depth of research to further obtain the cooperation and connection data of different topics in the field of public administration, investigate the dynamics of public administration scientific research cooperation in more detailed research directions, such as multidimensional network connections between countries, cities, institutions, and individuals on emerging topics such as governance, departmental performance, and public service, and deeply understand the status quo and power distribution of cooperation in the field of global public administration.

References:

1. Agarwal, P.K., 'Public Administration Challenges in the World of AI and Bots', 2018, *Public Administration Review*, vol. 78, no. 6, pp. 917–921.
2. Buleca, J. and Mura, L., 'Quantification of the Efficiency of Public Administration by Data Envelopment Analysis', 2014, *Procedia Economics and Finance*, vol. 15, pp. 162–168.
3. Christensen, T. and Lægreid, P., 'An Organization Approach to Public Administration, in Ongaro, E. and Van Thiel, S., *The Palgrave Handbook of Public Administration and Management in Europe*, Springer, 2018, pp. 1087–1104.

4. Desouza, K.C. and Jacob, B., 'Big Data in the Public Sector: Lessons for Practitioners and Scholars', 2017, *Administration & Society*, vol. 49, no. 7, pp. 1043–1064.
5. Farazmand, A., 'Globalization and Public Administration', 1999, *Public Administration Review*, vol. 59, no. 6, pp. 509–522.
6. Farazmand, A., 'The Future of Public Administration: Challenges and Opportunities—A Critical Perspective', 2012, *Administration & Society*, vol. 44, no. 4, pp. 487–517.
7. Grandy, C., 'The 'Efficient' Public Administrator: Pareto and A Well-rounded Approach to Public Administration', 2009, *Public Administration Review*, vol. 69, no. 6, pp. 1115–1123.
8. Han, Y., 'The Impact of Accountability Deficit on Agency Performance: Performance-Accountability Regime', 2020, *Public Management Review*, vol. 22, no. 6, pp. 927–948.
9. Hodge, G.A. and Greve, C., 'Public-private Partnerships: An International Performance Review', 2007, *Public Administration Review*, vol. 67, no. 3, pp. 545–558.
10. Holzer, M. and Schweser, R., 'Privatization and the Public Interest: Highway 407 Revisited: Chandran Mylvaganam and Sanford Borins. 2004. "If You Build It ...": Business, Government, and Ontario's Electronic Toll Highway. Toronto, Canada: University of Toronto Press. 164 pp.', 2006, *Journal of Public Administration Research and Theory*, vol. 16, no. 3, pp. 495–497.
11. Yuan, H. and Wu, M., 'Matthew Effect and Empirical Analysis of User Information Demand' (in Chinese), 2011, *Information Science*, vol. 29, no. 5, pp. 747–751.
12. Johansson, V. and Montin, S., 'What If Performance Accountability Mechanisms Engender Distrust?', 2014, *Urban Research & Practice*, vol. 7, no. 2, pp. 213–227.
13. Lavertu, S., 'We All Need Help: 'Big Data' and the Mismeasure of Public Administration', 2016, *Public Administration Review*, vol. 76, no. 6, pp. 864–872.
14. Maciejewski, M., 'To Do More, Better, Faster and More Cheaply: Using Big Data in Public Administration', 2017, *International Review of Administrative Sciences*, vol. 83, no. 1_suppl, pp. 120–135.
15. Manzo, A., 'A Look at Efficiency in Public Administration: Past and Future', 2014, *Sage Open*, vol. 4, no. 4, <https://doi.org/10.1177/21582440145649>.
16. Meynhardt, T., 'Public Value: Turning a Conceptual Framework into a Scorecard', in Bryson, J.M., Crosby, B.C. and Bloomberg, L., *Public Value and Public Administration*, Washington D.C.: Georgetown University Press, 2015, pp. 147–169.
17. Runya, X., Qigui, S. and Wei, S., 'The Third Wave of Public Administration: The New Public Governance', 2015, *Canadian Social Science*, vol. 11, no. 7, pp. 11–21.
18. Shafritz, J., Russell, E.W., Borick, C. and Hyde, A., *Introducing Public Administration*, New York: Routledge, 2016.
19. Tansley, A.G., 'The Use and Abuse of Vegetational Concepts and Terms', 1935, *Ecology*, vol. 16, no. 3, pp. 284–307.
20. Van Thiel, S., *Research Methods in Public Administration and Public Management*, New York: Routledge, 2014.