

Abstract

Public–private partnerships (or PPPs) encompass a broad spectrum of public sector infrastructure and service initiatives. Recently, some scholars have undertaken literature review studies of the various definitions of the concept of PPPs and its research traditions, identifying several distinct PPP research approaches. This article aims to: (1) enhance the findings of these literature reviews; (2) identify the cited works and authors (intellectual structure) in the published research on PPPs; (3) define the subfields that constitute the intellectual structure of PPP research fields. The methodology is based on the bibliometric techniques of citation and author co-citation analysis applied to published research on PPPs included in the Social Science Citation Index.

Key words

Bibliometric analysis, public–private partnership

THE INTELLECTUAL STRUCTURE OF RESEARCH INTO PPPS

A bibliometric analysis

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INTRODUCTION

In the past twenty years, public–private partnerships (PPPs) have come to the attention of scholars in a variety of research fields and of practitioners working for government and business. Although – ‘or perhaps because of’, as Bloomfield (2006: 400) notes – there is still no consensus regarding its definition, considerable research into PPPs has been published (including articles, papers, books and reports). These contributions have shed light on a vast array of issues relating to PPPs, ranging from general and conceptual works to more sector-specific approaches, revealing the different ways that PPPs are used. Nowadays, among scholars and practitioners of PPPs, there is an emerging awareness of the need to re-examine the different meanings and definitions given to PPPs in order to analyse the domain of PPPs and their intellectual structure, ‘to find out if the concept is still worth keeping and using for empirical studies’ (Hodge and Greve 2007: 545) and facilitate ‘cumulative knowledge-building’ (Weihe 2006: 5).

Some scholars have recently embarked upon a review of literature to study the various definitions of the PPP concept and the development of the research (Wettenhall 2003; Weihe 2006; Hodge and Greve 2007, 2008). They have evolved several classification systems, identifying distinct approaches to PPP research. Due to the fact that these works did not refer to the same classification system, there is a slight overlap between the PPP families and at the same time, some authors highlighted a possible overlap between their own suggested categories (Hodge and Greve 2008). Hodge and Greve (2007: 546) review the ‘various definitions of PPP concept’, distinguishing two main approaches among researchers: those who theorize PPPs as a ‘tool of governance’ and those who conceive PPPs as a ‘language game’. The former break the PPP concept down into five families of arrangements: institutional co-operation for joint production and risk sharing; long-term infrastructure contracts; civil society and community development tool; urban renewal; and downtown economic development tool. Overall, Hodge and Greve state that these PPPs can be classified according two main dimensions, financial and organizational. Conversely, the latter suggest the term PPP be adopted simply to make more appealing among the public debate terms such as ‘contracting out’ and ‘privatization’. Yet, despite providing a first systematization of the concept, Hodge and Greve’s empirical analysis ultimately focused on one type of partnership arrangements, the Private Finance Initiative (PFI) model from the UK, without a deeper analysis of the concepts connected to the other several PPPs provided. In a similar vein, Weihe (2006) tries to identify a number of distinct PPP research approaches, stating that PPPs do not only differ according to parameters such as number of actors, financial involvement and level of institutionalization, but also to the different research traditions. Specifically, five PPP approaches are suggested: local regeneration; policy approach; infrastructure approach; development approach; and governance approach. Although the valuable findings recognize the existence of different research approaches and provide information about their origins and traditions, the classification does not provide an ultimate clear classification of the PPP approaches. Weihe actually

does not distinguish PPP ‘practices’ and fields (such as infrastructure, local regeneration, development) from conceptual approaches (i.e. the governance approach). Finally, Wettenhall (2003), moving from a review of the literature on public sector reform and from a comment to three surveys on PPP practices, shows how widespread references to public–private partnerships are and calls for a serious research attention to develop a classification of PPP arrangements.

Notwithstanding the value of these findings and the insight they provide concerning the various meaning and definitions of PPPs, these traditional reviews of literature did not reveal the ‘intellectual structure’ that research into PPPs was based on. They provide just a classification of PPP practices (not even encompassing all of them) or even if they try to define a PPP concept classification, they mix up ‘concept’ with ‘practice’. Indeed, the intellectual structure of a field of research can be defined as the manner in which its conceptual items are organized, interrelated and displayed. The purpose of this article is to gain an inclusive and cross-disciplinary view of the clusters of concepts related to PPPs, in order to understand how those conceptual items are organized and interrelated. Therefore, the analysis of PPPs’ intellectual structure aims to provide the articulation of the distinct set of fundamental concepts in the PPPs’ field of research and enables a deeper understanding of PPPs’ central theoretical approaches. Other literature review techniques can be applied in order to analyse systematically the domain of a field of research and to map its intellectual structure, such as the bibliometric method. Bibliometric techniques refer to ‘all efforts to quantify (with mathematical and statistical analysis) the communication process embodied in written and published works’ (Pritchard 1969: 348). This method attempts to quantify and address the intellectual structure of a research field starting from the mathematical and statistical analysis of patterns that appear in the publication and use of documents; for this reason, it is considered a research technique able to enhance the findings of qualitative literature studies and to validate what experts may have intuitively inferred (White and Griffith 1981; McCain 1990; White and McCain 1998). The most common bibliometric techniques are citation and co-citation analysis, whose validity in discerning the intellectual structure of a scientific discipline has been demonstrated by several studies (Small 1973; White and Griffith 1981; Culnan 1987; Culnan *et al.* 1990; White and McCain 1998; Ding *et al.* 1999). In particular, bibliometric techniques have been applied in the past twenty years for the study of academic publications in different management research fields (see (Ramos-Rodriguez and Ruiz-Navarro 2004; Nerur *et al.* 2008). To the best of our knowledge, no such study has dealt with PPPs as the field of research.

The aim of this article is to fill a gap in the literature on PPPs by applying bibliometric techniques to a representative collection of published research relating to this disciplinary area, in order to:

- 1 present and discuss published research into PPPs, in order to complement and enhance the findings of other studies that have described it from a more qualitative perspective;

- 2 identify cited works and authors (intellectual structure) of the published research into PPPs;
- 3 outline the subfields that constitute the intellectual structure of the PPP research field.

After introducing the research design with a description of the methodology employed, the article presents and investigates the results of the empirical study; the narrative covers each of the three main objectives of the study. The article closes with a discussion of the conclusions of the research, highlighting its limitations and suggesting further avenues for research.

RESEARCH METHODOLOGY

As mentioned above, several articles report the use of bibliometric techniques in other areas of management research. This study of PPPs adopts the most frequently used bibliometric techniques: citation and co-citation analysis.

Citation analysis aims to identify the works and authors that have had a significant impact on a field of academic research (impact indicators). It is based on the principle that authors cite documents and authors they consider to be important for the development of their research; the most frequently cited documents and authors are likely to exert more influence than those who are less frequently cited (Culnan 1987; Tahai and Meyer 1999).

Co-citation analysis is used to discern the intellectual structure of a research field, clarifying subfields in a discipline and explicating ideational relationships between them. The unit of analysis can be either documents or authors, but the most consistent technique is considered author co-citation analysis (ACA) (White and Griffith 1981; McCain 1990; White and McCain 1998).¹ Authors who have made seminal contributions to a discipline are the units of analysis in this technique, since the citation of an author is considered a reference to the concept (or concepts) for which the author is known. In fact, authors' works over a period of time are frequently characterized by thematic consistency, advocacy to a particular perspective and cumulative contributions to the development of a specific research topic. Therefore, the name of the author is just a label to address a concept or an idea he/she developed. ACA's basic assumption is that the conceptual similarity among the works of the authors considered as unit of analysis would increase the likelihood of their being cited together (McCain 1990). The frequency of co-citation is a measure of the proximity between authors: ACA counts the frequency of any work by an author being linked to any work by another author in a third and later work; the more frequently two scientists are cited together and the more similar their patterns of co-citation with others, the closer the relationship between them. This approach makes it possible to identify groups of authors and to understand how these clusters interrelate (relation indicators). The

output of co-citation analysis is a co-occurrence (co-citation) matrix (proximity similarity matrix) of the citation frequency of each pair of authors in any two reference lists. This matrix is used as input in order to represent graphically the intellectual structure.

In this study, ACA is combined with social network analysis² in order to define the structure and the map of the intellectual network, tracing prominent links between the most cited authors in order to identify schools of thought and prevailing research topics and to discern which authors play a pivotal role in bridging different research approaches.

The study was conducted in three separate stages (see Figure 1).

At stage one, the analysis required the creation of a database of published research. Databases used for bibliometric techniques usually come from different sources (such as personal knowledge, consultation with researchers, surveys, textbooks, review articles) (McCain 1990). One relatively objective way to identify the source documents is to choose those with many references in a collection of review articles by a select set of journals (so called 'source articles'). In this study, there was no a priori set of journals relating to PPP research, therefore the published research into PPPs was identified through a bottom-up and explorative approach, using the ISI Web of Science database – SSCI Social Sciences Citation Index (SSCI)³, which is the largest, most commonly used and generally accepted source for bibliometric studies. The source documents were retrieved in May 2008 by entering two key words in the SSCI 'topic' field:⁴ public-private partnership (PPP); public-private collaboration (PPC). These key words are often used as synonyms to identify institutional collaborations between the public and private sector.

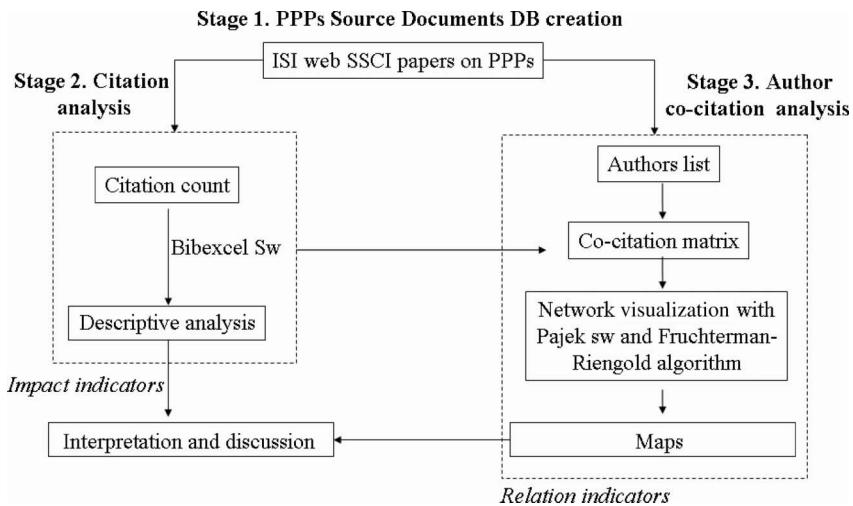


Figure 1: Research design

The SSCI's edition used in this article admits research starting from 1990. This starting date is consistent with the focus of the research. In fact PPPs as governance arrangements were emphasized within the realm of the public management reforms of the late 1980s/early 1990s that were aimed at promoting downsizing of the traditional public sector, the shift towards a vision of the State as regulator, as opposed to the State as provider, and the rapid growth of private sector provision of public services (Pollitt and Bouckaert 2000). As such, 1990 can be considered the starting date for the PPP literature. The time frame of the bibliometric analysis covers eighteen years, from 1990 to 2007 and the final database included 323 references.

The second stage consisted of citation analysis. A set of bibliometric data was retrieved for each source document from the SSCI database (i.e. for the source documents: title, journal, year of publication, volume and first page number, names of all authors, keywords; for the cited references: first author, year of publication, journal/book title, volume and first page). Inconsistencies were eliminated from all the bibliometric data, including the 10,347 cited references (i.e. misspelling of authors' names)⁵ and it was then converted into a bibliometric file for the citation analysis with ad hoc bibliometric software.⁶

The third and last stage was the author co-citation analysis and the network visualization. The PPP co-citation matrix was generated using the bibliometric software. This matrix contains the information regarding the structure of the intellectual PPP network; in fact each network is defined by a specific type of relation (i.e. conceptual similarity co-citation) that links a set of nodes (i.e. authors). The co-citation matrix was exported to Pajek,⁷ one of the most common network visualization softwares (de Nooy *et al.* 2005), in order to map the network. A threshold of five co-citations was used to enhance map significance and the Fruchterman-Reingold network algorithm was applied in order to minimize system stress in the network⁸ (Fruchterman and Reingold 1991).

RESULTS AND DISCUSSION

This section contains the details and results of each stage of the bibliometric analysis.

Published research into PPPs

The amount of published research into PPPs has been growing significantly over the past eighteen years. Almost 72 per cent of the source documents were published in the last seven years.

As far as the type of publication is concerned, most of the database (# 298, 82 per cent) contains articles from academic journals and just 8 per cent refer to academic books. The bibliometric analysis was conducted on this sub-database: scientific works

are the preferred unit in bibliometric studies, as they are ‘the major formal channel in which research and other scholarly activities are recorded and communicated’ (McCain 1991: 290).

The variety of approaches to PPPs identified by other literature reviews emerges very clearly with the analysis of the source database. Looking at the specialization level of PPP authors, there is a lack of distinct leading PPP scholars. Most of the authors have published just one work on PPPs (#280, 94 per cent). In addition, the level of multi-authorship among PPP research points to a scant collaboration among authors: most source documents were written by one (#146, 49 per cent) or two authors (#92, 31 per cent) and just the remaining 20 per cent by more than two authors (see Figure 2). These two aspects could represent a drawback for the development of this field of research; in fact recent empirical studies have uncovered the benefits that scientists can gain from specializing in terms of research productivity, promotion, tenure standards and academic earnings (Guimerà *et al.* 2005) and the positive effects of multi-authorship on the outcome of research, suggesting that teams typically produce more frequently cited research than individuals do (Wuchty *et al.* 2007).

The analysis of the journals that published at least one article on PPPs confirms the presence of several approaches to PPPs; in fact 132 out of the 188 source journals (70 per cent) published just one article. Nevertheless, there is a group of nineteen whose frequency of published articles on PPPs is higher than three (see Table 1).

We can identify four main themes related to PPPs, assigning each of these journals to an area of specialization using the subject areas of the SSCI classification. The four themes are: public administration; healthcare policy and services; planning and development; urban studies,⁹ with a prevalence of the first two specialities. There is only partial overlap comparing this classification with those provided by other authors, who developed their own categories (Weihe 2006; Hodge and Greve 2007).

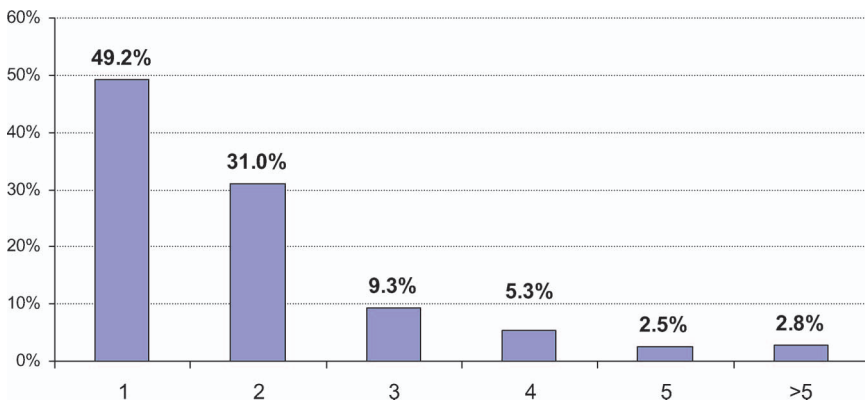


Figure 2: Number of authors per article

Table 1: Most preferred journals

<i>Journal title</i>	<i>Freq.</i>	<i>Impact factor</i>
<i>Behavioural Healthcare Tomorrow</i>	15	NA
<i>Public Money & Management</i>	8	.779
<i>International Review of Administrative Sciences</i>	8	.446
<i>Public Administration and Development</i>	6	.581
<i>Habitat International</i>	6	.389
<i>Research Policy</i>	5	2.211
<i>Cities</i>	5	.732
<i>Journal of the American Planning Association</i>	5	1.545
<i>Non Profit and Voluntary Sector Quarterly</i>	5	.559
<i>Health Affairs</i>	5	3.680
<i>Public Administration Review</i>	5	1.339
<i>Food Policy</i>	5	.942
<i>American Behavioural Scientist</i>	5	.573
<i>Local Government Studies</i>	4	.486
<i>Public Administration</i>	4	1.188
<i>Administration and Policy in Mental Health</i>	4	1.146
<i>Economic Development Quarterly</i>	4	.451
<i>Health Policy and Planning</i>	4	1.750
<i>Transportation Quarterly</i>	4	NA

PPP journals have higher impact factor (IF) compared to the average IF of the journals included in these four disciplines. American journals prevail with the exception of the area of public administration.

Citation analysis

The distribution frequency of the publication years of the 10,347 citations analysed reveals that most of the cited works (83 per cent) were published from the late 1980s onwards; 36 per cent from the beginning of the twenty-first century (see Figure 3). This timeframe largely coincides with the study period and it highlights the quite recent evolution of PPP intellectual structure.

More than 95 per cent of the cited works received just one citation and only 43 per cent of them have a frequency citation higher than three. There is a balance between the articles (56 per cent) and the other types of publication (books, reports, etc.). This might indicate there is reliance on empirical studies (traditionally published in academic journals) but also on more theoretical and qualitative studies (books traditionally use a more general approach, providing examples and case studies). There is a group of

sixteen cited works whose citation frequency is higher than four. Among these, the most cited are linked to the discipline of public administration, followed by works related to healthcare policy and services (see Table 2).

The author citation analysis (regardless of the individual works published) shows that 78 per cent of the 6,670 cited authors received just one citation. At first glance, focusing on the authors with a citation frequency higher than 10, four main clusters can be identified (see Table 3):

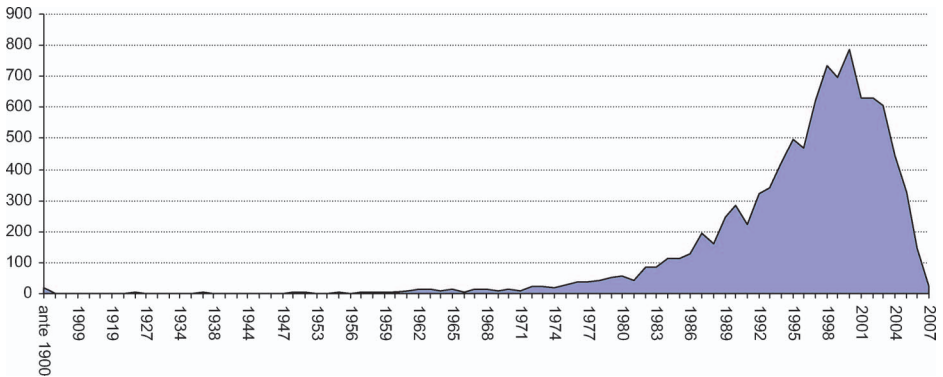


Figure 3: Frequency distribution of citation publication dates

Table 2: Most cited documents

Rank	Raw freq. > 4	Document cited	Book/Journal
1	10	Savas (2000)	B
2	7	Osborne (2000)	B
3	7	Osborne and Gaebler (1993)	B
4	7	Linder (1999)	J
5	7	Grimsey and Lewis (2004)	B
6	7	Buse and Walt (2000a)	J
7	6	Uplekar <i>et al.</i> (1998)	J
8	6	Rosenau (1999)	J
9	6	Buse and Waxman (2001)	J
10	6	Buse and Walt (2000b)	J
11	5	Williamson (1985)	B
12	5	Uplekar <i>et al.</i> (2001)	J
13	5	Porter (1990)	B
14	5	Logan and Molotch (1987)	B
15	5	Grout (1997)	J
16	5	Batley (1996)	J

Table 3: Most cited authors

<i>Raw freq. > 10</i>	<i>Author</i>	<i>Author affiliation</i>
57	WHO	IGO – health
56	WB	IGO – financial and trade
29	O. Williamson	Economics – transaction cost
24	K. Buse	Economics – linked to IGO-WHO
20	D. Osborne	Public administration and management
19	E. Savas	Public administration and management
18	O. Hart	Economics – contract theory
17	S. Osborne	Public administration and management
16	M. Uplekar	Economics – linked to IGO-WHO
16	UN	IGO
16	National Audit Office	Governmental institution – UK
16	A. N. Link	Economics – innovation, entrepreneurship and technology
14	B. N. Stone	Local government and public policy
14	M. Porter	Strategy and competitiveness (economic development and social)
14	OECD	IGO
14	HM Treasury	Governmental institution – UK
13	P. A. Rondinelli	Public administration and management
13	B. Jesson	Political sociology
12	R. Widdus	Economics – linked to IGO-WHO
12	L. M. Salamon	Public administration and management
11	US Census Bureau	Governmental institution – USA
11	E. Ostrom	Economics – link to transaction cost theory
11	E. H. Klijn	Public administration and management
11	R. Moss Kanter	Strategy and innovation – link with network society theory
11	M. Castells	Network society theory

- the cluster of governmental and intergovernmental organizations (IGOs), including: governmental institutions such as the UK HM Treasury and National Audit Office and the US Census Bureau; IGOs such as the World Health Organization (WHO), the World Bank (WB), the United Nations (UN) the Organization for Economic Co-operation and Development (OECD) and authors affiliated to these IGOs such as K. Buse, M. Uplekar and R. Widdus;
- the cluster of public administration and public policy academics, including authors such as S. Osborne, D. Osborne, E. Savas, P. A. Rondinelli, L. M. Salamon and E. H. Klijn (public administration and management) and C. N. Stone and B. Jesson (public policy and political sociology);
- the cluster of scholars of new institutional economics, such as O. Williamson and O. Hart (transaction cost and contract theory) and E. Ostrom;

- the cluster of scholars of strategy and alliance/network theory, such as M. Porter, R. M. Kanter and M. Castells.

Author co-citation analysis

The author co-citation analysis provides several useful insights for understanding the influence of these authors on the intellectual structure of the PPP research field.

Figure 4 shows the PPP intellectual structure. The size of the points reflects authors' co-citation frequency. The width of the lines corresponds to the strength of the relation between nodes (i.e. the number of pair co-citation). Proximity between authors is shown by the links and not by the spatial closeness to one another.

According to Burt's (1992, 2005) concepts of closure,¹⁰ brokerage and structural holes,¹¹ it is possible to interpret the network map, providing interesting insights into the network structure of the intellectual community in the PPP research field.

There is no significant structural hole among the network. By focusing on the degree of closure between nodes, the map enables two main clusters to be identified.

The first cluster, located in the upper left part of the network, is labelled the 'Intergovernmental Organizations – IGOs' Cluster. It encompasses several IGOs, who act as promoters of PPPs in different sectors and countries (especially developing ones). Articles published by these IGOs provide either statistical data or empirical studies on the diffusion of PPPs in developing countries or knowledge management for the

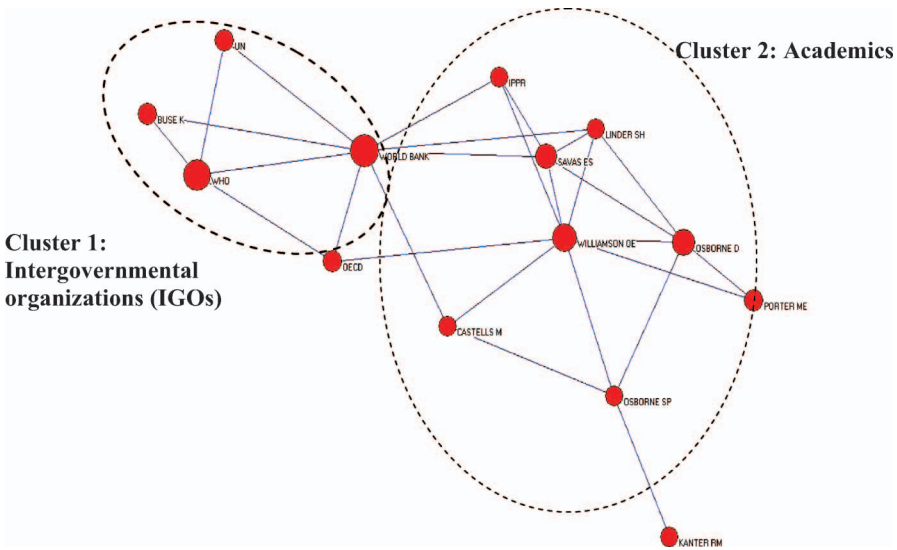


Figure 4: The intellectual structure of PPPs research field

implementation and operation of PPPs. PPPs involving public governments (often not so sophisticated in their management practices) and private organizations (both for-profit and non-profit), are seen as a tool to improve and support the introduction of innovative public governance approaches and the provision (and quality) of basic public services. The other two main IGOs (both in terms of citation frequency and their central position in the cluster) are the World Bank (WB) and the World Health Organization (WHO).

The WB often uses the term PPPs as a synonym for PFI. The WB recently created a resource library (i.e. the Global PPPI – Public–Private Partnerships in Infrastructure) to provide network members with easy access to publications, reports and papers related to Public–Private Partnerships in Infrastructure. This electronic library contains both theoretical and practical content and covers a wide range of sectors (education, energy, health, telecommunication, transportation, water and sanitation).

The WHO, on the other hand, focuses essentially on healthcare but uses the PPP concept with a broader spectrum of approaches, ranging from infrastructures to support for health policies and research issues (prevention and control of infectious disease, reproduction health issues, nutritional deficiencies, etc.).

The second cluster mainly comprises academics whose works represent a theoretical framework for the analysis of PPPs.

The map makes it possible to identify two main approaches among the theoretical frameworks for PPP analysis.

Williamson (1985) and the transactions cost economics theory (TCE) constitutes the most cited theoretical framework for PPP analysis. According to this theory, PPPs are considered a contract acting as an intermediate governance mechanism, called hybrid or relational, between the market (private sector) and the hierarchy (public sector) in order to reduce the transaction costs of the provision of public services. The output and outcome required from these agreements between public and private sectors have characteristically been specified and monitored through detailed contracts.

Some scholars have recently criticized this approach as being a framework incapable of taking more ‘social’ aspects relating to a PPP contract into account (e.g. behavioural factors) (Teisman and Klijn 2002; Klijn and Teisman 2005; Weihe 2008). According to these, the functioning of a hybrid relationship not only requires a well-structured contract mechanism aimed at reducing transaction costs, but also a degree of mutual trust between the parties (especially for long-term partnerships) and a new governance mechanism, referred to as the ‘network approach’. This model has its fundamental progenitors in Castells (1996, 1997, 1998), one of the founding fathers of the network society and community and urban sociology, and Kanter (Kanter 1994) who is one of the most important scholars of inter-organizational theory and the strategic alliance theory. The interest in the ‘network society’ theory has experienced an important impetus since public–private partnerships are assumed to be a more suitable way of organizing public initiatives in a network-oriented society. From this perspective, PPPs become a new governance paradigm to manage the inter-dependency of governmental

agencies and private and third-sector organizations. In fact, a characteristic of the network society is the blurring of the borders between the public and private sectors in addition to the interdependency of these various organizations (Castells 1996, 1997, 1998). According to this framework, the mutual adjustment of public and private strategies becomes a fundamental prerequisite for the success of numerous PPPs in several sectors (not only in the provision of infrastructure services). This mutual adjustment not only requires the stipulation of a contract, it also calls for synergy and trust (Kanter 1994); such issues are not simply personal unmanageable 'feelings', but they can be achieved and secured through governance strategies. The shift towards a 'network model' as framework for the analysis of PPPs is still an embryonic movement; this sociological-oriented approach is actually positioned more towards the periphery of this cluster compared to economics and Williamson's central location. This could be a consequence of a certain limit in citation analysis: (1) even scholars who are not taking the TCE as a theoretical framework for PPP analysis, often cite Williamson and criticize his approach; (2) the sociological-approach is relatively more recent than the TCE and therefore could be underrepresented in a bibliometric analysis (see below).

As far as the published PPP research is concerned, two different streams of research can be identified, both represented by scholars of public administration and management. Each of them is connected to one of the most influential theoretical frameworks. The first group (positioned in the upper right part of the map) includes S. Savas, S. Linder, D. Osborne and the IPPR (Institute for Public Policy Research) and has stronger links (in terms of closure) with the TCE approach. These scholars consider PPPs to be a tool for fostering the privatization (through delegation) of the provision of some public services, especially those that are infrastructure-based. Savas (2000: 126–29) reports 'with delegation [i.e. PPP], government retains responsibility and oversight, but uses the private sector for service delivery, for example, by contracting for services, or outsourcing'. Linder (1999) notes the 'multiple grammars' of PPP, with governments avoiding the terms of 'privatization' or 'contracting out' in favour of 'partnerships', a warmer, friendlier and catchier name for traditional public policies. D. Osborne supports PPPs and delegating the financing and management of public services to the private sector as a way to improve near-term performance efficiencies of government by way of cutting costs and enhancing service quality (Osborne and Gaebler 1993).

The second stream of research is represented by the works of S. Osborne. The linkage with Williamson is weaker (in term of closure) and there is a direct connection with Castells and Kanter. The pattern of S. Osborne's location can be explained by looking at his famous work on PPPs where he points out that, in the 'network society' environment, PPPs can be considered a new public governance paradigm to improve the efficiency and effectiveness of public service delivery (not only those that are infrastructure-based) (Osborne 2000). In this scenario, PPPs are not synonymous with contracting out, but are defined as an inter-organizational co-operation arrangement calling for new co-operative governance processes as well as new policy-making processes. This is coherent with the wider range of subjects covered in Osborne's book,

such as the processes for establishing partnerships, the evaluation of the performance of partnerships, special features of partnerships involving NGOs (and not only for-profit partners) and the general impact of partnerships on the policy-making process, offering 'theoretical perspectives on [PPPs] as well as a range of case studies of their management from around the world' (Osborne 2000: i). Like S. Osborne, Porter (1990) refers to PPPs as a potential driver to enhance the 'competitive advantage' of the public sector.

CONCLUSIONS, LIMITATIONS AND FURTHER RESEARCH

The objective of this article was to identify and discuss the intellectual structure of the PPP field of research through citation and author co-citation analysis. The findings presented and discussed in the previous section lead to the following conclusions.

Published research on PPPs

There is no core PPP concept; a high number of scholars from different disciplines have been writing about PPPs in various journals, providing evidence that confirms the findings of other literature reviews. The most frequent 'relative' fields of research correlated to PPPs are: public administration; healthcare policy; urban studies; planning and development studies. This classification differs from those provided by scholars in other literature reviews and it is the outcome of the identification of specific categories, using a generally accepted journal classification scheme (SCCI). It is interesting to note the lack of PPP works related to the business administration and management fields. American journals prevail among those that have published works on PPPs, with the exception of the public administration field (the most frequent field in the cited journals).

Citation analysis

Fragmentation is the main distinguishing feature of the cited references, with a high number of cited works/authors: few received more than one citation. Among the most cited works, references correlated to public administration are the most cited (and are often academic books), followed by works on healthcare policy and services (in this case there is a prevalence of academic articles).

As far as the most cited authors are concerned, four main clusters were identified: governmental and intergovernmental organizations (IGOs), public administration and public policy academics, scholars of transaction cost and contract theory and scholars of strategy and alliance/network theory.

Author co-citation analysis

Only the ACA has been able to provide insight into the interrelations among them. Author co-citation analysis, combined with social network analysis, helps identify different clusters of authors representing the PPP domain and the interrelations among them. In particular, the intellectual PPP structure consists of two main subfields (clusters). The first cluster, labelled 'IGOs', includes promoters of PPPs mainly in developing countries with a focus on infrastructure-based services or with a more general healthcare policy programmes approach. The second cluster, encompassing scholars and academics, reveals two main different frameworks for PPP analysis, transaction cost economics and a more sociological approach based on the network society theory, both used by public administration scholars (who are the most productive and co-cited scholars among the intellectual PPP domain), to support the interpretation of PPPs either as promoters for the privatization of public service delivery (most of which are infrastructure-based) or as a new public governance paradigm.

Indeed, the results stemming from this analysis reveal the inner development of the debate onto PPPs. PPPs as governance arrangement was emphasized within the realm of public management reforms which aimed at promoting downsizing of the traditional public sector and the shift towards a vision of the State as regulator, as opposed to the State as provider. As such, the prevalence of practitioner-authored and NGOs contributions is explained by the interest in producing evidence and experience-driven studies to support *in primis* governmental policies. This distinctive characteristic of the debate onto PPP enables us to explain the relative weight of the former contributions on a still emerging theoretical field.

To restate the above arguments, the analysis has revealed how the PPP concept originated and was brought forward by specific streams of literature to account for a new pragmatic/contingent implementation of public sector polices (public management literature) or of contractual infrastructural arrangements (IGO and practitioner perspective). By focusing on the intellectual roots beneath the PPP concept, the article aims at fostering the dialogue among different disciplines investigating the construct, thus providing a basis for the further theorization of the phenomenon.

Like all methodologies applied in social science, this study also has its limitations, related both to the research design and to the bibliometric techniques chosen for the analysis.

One of the main drawbacks of the research design is the criteria used for the selection of the source documents on PPPs, in particular the use of the ISI Web of Science database –SSCI. Even though the SSCI database is considered the largest, most commonly used and generally accepted source for bibliometric studies, the collection of source PPPs retrieved may represent just a fraction of the overall PPPs research works (e.g. by not including the research published in languages other than English or disciplines that are not well represented in the SSCI database).

As far as the citation analysis is concerned, the main issue is that all citations are considered alike (Cronin 1984), whereas in reality it is difficult to distinguish why

specific citations were made and the rationale for citing a study could vary considerably, from considering one's work a cornerstone in the evolution of a discipline, to criticizing a work as weak (see Baumgartner and Pieters 2003). Furthermore, some influential authors could be underrepresented, due to the fact that their work was published more recently. Since citation analysis considers citation frequency as an indicator of scientific influence rather than productivity, this is not actually a factor that could mislead the findings, as also confirmed by the relatively high number of citations received by recent works. Finally, in case of multi-authorship cited works, citation analysis only retrieves the first author. Although the first author can often be considered the leading author, this bias may minimize the contribution of other influential authors.

Co-citation analysis also presents some limitations, the most significant two being that analysis has to be performed on a small fraction of co-cited works (i.e. a threshold of five co-citations) to obtain a readable map and that a certain degree of subjectivity is required to interpret that map.

In conclusion, despite these limitations, this study demonstrates that bibliometric analysis, and in particular ACA combined with social network analysis, is a method that has potential for management research, especially in newly developed areas such as PPPs. As a complement to traditional qualitative methods of reviewing the literature, this study provides a quantitative analysis that can help the establishment of a future research agenda on this topic. In particular, this study corroborates the previous classification of PPPs, reducing possible overlapping between the identified categories, enhancing the understanding of PPP intellectual structure, identifying journals and authors that have been more 'productive' in this research field and filling the gap in PPP literature by defining (with a visual representation) the subfields that constitute the intellectual structure of PPP research and the linkages between them.

Further research on bibliometric analysis of PPPs is possible by extending the source sample, using other academic databases (e.g. 'Google Scholars', Business Source Premier) and also including other forms of scientific and technical writing (such as conference proceedings, working papers, doctoral theses, etc.). A bibliometric analysis of a larger source database may uncover other authors who have significantly contributed to PPP literature, but who are not retrievable using SCCL. Future studies could be also conducted for the analysis of the longitudinal evolution of PPP intellectual structure, identifying changes of the theoretical framework of PPPs over the course of time. Furthermore, research could discuss deeper and more qualitatively the different PPPs subfields outlined in this article using, for example, content analysis technique.

List of acronyms

ACA: Author co-citation analysis

IF: Impact factor

IGOs: Intergovernmental organizations

IPPR: Institute for Public Policy Research
 NGOs: Not for profit organizations
 OECD: Organization for Economic Co-operation and Development
 PPC: Public–private collaboration
 PPPs: Public–private partnerships
 PFI: Private finance initiative
 SSCI: Social Science Citation Index
 TCE: Transactions cost economics theory
 UN: United Nations
 WB: World Bank
 WHO: World Health Organization

NOTES

- 1 While single works of an individual may represent a scientific revolution, more often it is a body of writing by a scientist that places that person in the intellectual and influence structure of a field.
- 2 The main rationale behind social network analysis is that social structures can be described not only in terms of individual attributes but also in terms of relations (Borgatti and Everett 1997).
- 3 Social Science Citation Index (SSCI) is a database that records not only the title, authors, source, keywords and other data relating to each article, but also the bibliographic references contained in it.
- 4 The field 'topic' covers the title and the abstract of each reference.
- 5 Since the bibliometric software employed only recognizes exactly coinciding strings of characters, a manual normalization process is required in order to guarantee accuracy, especially in the spelling of authors' names, the journals in which the articles appear and the first edition of each book cited. For example, we find that 'WILLIMANSON O.E., 1985' and 'WILLIMANSON O., 1985' are two citations of the same, well-known work by Williamson (Williamson 1985). In the first citation, the author's name is coded with two initials and with only one in the second.
- 6 The bibliometric file was analysed with Bibexcel software, developed by Professor Olle Persson at Umeå University (Sweden).
- 7 Pajek (Slovene word for Spider) software performs the analysis and visualization of large networks. It is freely available for non-commercial use.
- 8 The Fruchterman-Reingold Algorithm is a force-directed layout algorithm, commonly used to visualize social networks. This method compares a graph to a mechanical collection of electrically charged rings (the vertices) and connecting springs (the edges). Every two vertices reject each other with a repulsive force, and adjacent vertices (connected by an edge) are pulled together by an attractive force. Over a number of iterations, the forces modelled by the springs are calculated and the nodes are moved in a bid to minimize the forces felt. The basic idea is to minimize the energy of the system by moving the nodes and changing the forces between them.
- 9 *Public Administration* covers resources concerned with the management of public enterprises, implementation of governmental decisions, the relationship between public and private sectors, public finance policy and state bureaucracy studies. *Healthcare Policy & Services* covers resources on healthcare systems, including healthcare provision and management, financial analysis, healthcare ethics, health policy and quality of care. *Planning & Development* is concerned with resources on the economics and social development of both underdeveloped and industrialized areas. The resources in this category focus on subjects such as economic forecasting, development studies, policy-making strategies, theories of planning and the growth of the third

world. *Urban Studies* covers resources concerned with the social aspects of city planning and urban design. Topics covered include the effects of the urban environment on the individual, the effects of urbanization on the natural environment, urban economics, urban technology, housing planning, urban education and urban law.

- 10 Most network diagrams are characterized by clusters of dense connections linked by occasional bridge relations between clusters. Different clusters have different degrees of closure. The closure is the degree an individual is near all other individuals in a network/cluster. A high level of closure means there is decreasing variation and a high level of information flow within a cluster. In the context of research communities, closure results in faster communication within the group and a focused research agenda based on a unifying paradigm.
- 11 Gaps between clusters are referred to as structural holes. Brokers are those individuals who act as links between different clusters. Brokerage brings different research communities together, spurring cross-fertilization of ideas and theoretical innovation. There are opportunities for brokerage among subdisciplines within a field.

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