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“Modes of Network Governance”: What Advances Have Been Made So Far?

“Modos de Governança de Redes”: Que Avanços Foram Feitos Até o Momento?

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Abstract: The main objective of this article was to identify the advances in the studies of network governance stemming from the seminal work of Provan and Kenis (2008). Their eight propositions examine the characteristics of each form of governance, outline critical contingency components that may explain governance form effectiveness, discuss the tensions inherent in each form of governance, and explore the evolution of network governance over time. To reach this goal we conducted a meta-study of 224 articles, combining quantitative and qualitative analyses to help establish a map of the recent advances in the field of network governance. The joint analysis showed specific advances in the governance of public networks. In general terms, the studies remain highly fragmented and have yet to reach a greater level of consolidation. Although the proposal put forth by Provan and Kenis (2008) attempts to contribute to a better understanding of the modes, tensions and evolution of governance, it still requires more contributions to establish a theory on network governance. There is scope for further investigation of hybrid modes of governance, the critical contingencies that determine the choice of the most effective mode of governance, and the specific mechanisms used to operationalize each mode of governance.

Keywords: Network Governance, Meta Study, Social Network Analysis, Public Networks.

Resumo: O objetivo principal deste artigo foi identificar os avanços nos estudos de governança em rede, a partir do trabalho seminal de Provan e Kenis (2008). Suas oito proposições examinam as características de cada forma de governança, descrevem componentes críticos de contingência que podem explicar a eficácia da forma de governança, discutem as tensões inerentes a cada forma de governança e exploram a evolução da governança de rede ao longo do tempo. Para alcançar este objetivo, realizamos um metaestudo de 224 artigos, combinando análises quantitativas e qualitativas para ajudar a estabelecer um mapa dos recentes avanços no campo da governança de redes. A análise conjunta mostrou avanços específicos na governança das redes públicas. Em termos gerais, os estudos permanecem altamente fragmentados e ainda precisam atingir um nível maior de consolidação. Embora a proposta apresentada por Provan e Kenis (2008) tente contribuir para uma melhor compreensão dos modos, tensões e evolução da governança, ela ainda requer mais contribuições para estabelecer uma teoria sobre governança de redes. Há espaço para uma investigação mais aprofundada dos modos híbridos de governança, as contingências críticas que determinam a escolha do modo mais eficaz de governança e os mecanismos específicos usados para operacionalizar cada modo de governança.

Palavras-chave: governança de redes, meta-estudo, análise de redes sociais, redes públicas.

Introduction

The studies on inter-organizational relations (IOR) have received significant attention from scholars in recent years, as a result of the increase in the use of cooperative strategies between organisations. The course of said studies has revealed theoretical gaps and pointed to research opportunities (Cropper, Ebers, Huxham, & Ring, 2010), among which the advances in IOR governance stand out. Several concepts such as network governance (Marafioti, Mariani, & Martini, 2014; Provan, Isett, & Milward, 2004; Provan & Milward, 2001) governance networks (Klijn, 2008; Klijn & Skelcher, 2007), network orchestration (Dhanaraj & Parkhe, 2006; Dollet & Matalobos, 2010), network management (Agranoff & McGuire, 2001; Möller & Halinen, 1999; Ruffin, 2010; Verschoore, Wegner & Balestrin, 2015) and network coordination (Raeymaeckers & Kenis, 2016; Williams, 2005) have been used to address this topic over the years. Although this myriad of concepts has revealed the importance of the subject, it has also led to the fragmentation of the understanding of governance, which makes academic consensus based on a single guiding theory hard to reach.

It was in this inextricable context that Provan and Kenis (2008) published the article *Modes of Network Governance: Structure, Management and Effectiveness* in an attempt to contribute for the structuring of an actual field of studies and to establish a direction for its evolution. According to the authors, "there has been no theory on the various forms of governance that exist, the rationale for adopting one form versus another, and the impact of each form on network outcomes" (Provan & Kenis, 2008, p. 231). Their article rescued and organised three basic modes of governance (shared governance, lead organisation-governance, and network administrative organisation), established key predictors of effectiveness of network governance forms, and detailed three cardinal tensions in governance (efficiency versus inclusiveness, internal versus external legitimacy, and flexibility versus stability). Its eight propositions examine the characteristics of each form of governance, outline critical contingency components that may explain governance form effectiveness, discuss the tensions inherent in each form of governance and how they can be managed, and explore the evolution of network governance over time (Provan & Kenis, 2008). Despite the fact that network governance finds its roots on earlier studies (Milward & Provan, 2000, 2006; Provan & Milward, 1995) the Provan and Kenis (2008) article has establishing itself as one of the main references in a substantial number of studies on network governance (Isett, Mergel, Leroux, Mischen, & Rethemeyer, 2011).

We nonetheless questioned whether the reputation and influence of the article had been enough to structure and guide the field of research as the authors had intended. This questioning led to other such questions as, "How has the field of network governance evolved in recent years?", "What advances have been made regarding the propositions of the authors?", and "Have the modes, contingency factors and tensions of

governance become guides for the evolution of the topic?”. Said questions served as a starting point for our research, aiming to identify the advances in the studies of network governance stemming from the propositions presented by Provan and Kenis (2008). To this end, we conducted a meta-study (Barnett-Page & Thomas, 2009; Dixon-Woods, Agarwal, Jones, Young, & Sutton, 2005) combining quantitative and qualitative analyses in the ego network of articles that cite Provan and Kenis (2008). Although other meta studies already explored the topic of network governance (e.g. Ansell & Gash, 2008; Dal Molin & Masella, 2015; Pilbeam, Alvarez, & Wilson, 2012) its focus, methods and objectives are different from those in this study.

This paper is organised as follows: section 2 presents a brief overview of the main topics discussed in the article that served as a starting point for our study; section 3 presents the methodological features of our meta-study; section 4 presents the results of the analysis; while section 5 presents the conclusions and directions for future research.

Literature Review

The concept of network governance is understood from different perspectives in inter-organisational studies. A widely shared perspective uses the concept of network governance as an alternative form of organisation of economic activities (Lowndes & Skelcher, 1998; Powell, 1990) and strives to understand in which situations this form of governance is preferable to markets and hierarchies (Jones, Hesterly, & Borgatti, 1997). Another line of research endeavours to comprehend how the governance of inter-organisational networks occurs and what its effects on the efficacy of initiatives are (Provan & Kenis, 2008). From this perspective, governance refers to the way in which the network is structured and organised, to its regulatory and decision-making mechanisms, and to how it guarantees the interests of its members and assures the fulfilment of the established norms by both managers and participants.

In this line, Provan and Kenis (2008) identified three basic modes of network governance from which hybrid modes can be generated. The simplest mode is the shared governance, where a group of organisations works collectively as a network despite not possessing a structure of exclusive and formal management. The second mode is the lead organisation-governance, which typically occurs in relationships formed by a bigger, more powerful organisation and a set of lesser, weaker firms (Provan & Kenis, 2008). The third mode is the network administrative organisation, where an administrative entity is created specially to manage the network and its activities.

According to Provan and Kenis (2008) proposal, four contextual factors act as key predictors of effectiveness of network governance modes: the level of trust among network members, the number of participants, the level of goal consensus, and the need for network-level competencies (Figure 1). The relationship between these predictors

should enable the identification of the mode of governance best suited to the network, as no one mode of governance is necessarily superior in every situation.

Figure 1.
Key Predictors of the Effectiveness of Network Governance Modes

Governance Mode	Trust	Number of Participants	Goal Consensus	Need for Network Level Competencies
Shared governance	High density	Few	High	Low
Lead organization	Low density, highly centralized	Moderate number	Moderately low	Moderate
Network administrative organization	Moderate density, NAO monitored by members	Moderate number	Moderately high	High

Source: Provan, K. G., & Kenis, P. (2008). Modes of network governance: Structure, management, and effectiveness (p. 237). *Journal of Public Administration Research and Theory*, 18(2), 229–252.

However, choosing the best mode of governance is not a guarantee of success. As stated by Provan and Kenis (2008), “network managers operating within each form must recognize and respond to three basic tensions, or contradictory logics, that are inherent in network governance”. These tensions refer to the efficiency of the network versus the inclusiveness of its members in decisions and deliberative activities, to the internal versus external legitimacy of the network, and to the flexibility versus stability of the network. The management of these tensions is critical to the efficacy of the network: “Despite the absence of empirical research on how these three tensions occur regarding network governance, they are an essential, but problematic, aspect of network management” (Provan & Kenis, 2008, p. 246).

The fourth topic discussed by the authors refers to network evolution. When there is a discrepancy between the mode of governance chosen for the network and one or more of the critical contingencies, adopting a different mode of governance is a viable option. Provan and Kenis (2008, p. 246) argue that the change from one mode of governance to another is predictable, “depending on which form is already in place”. Evolution from shared governance to a more brokered mode is far more likely to occur than vice-versa. Therefore, it is not expected that lead organisation-governed and NAO-led networks should shift to shared governance at any given time, primarily due to the level of formalisation and stability of the first forms.

The set of topics discussed by Provan and Kenis (2008) has been summarized in eight propositions that we present in Figure 2.

Figure 2.
Propositions of Provan and Kenis (2008)

Propositions regarding the four contingency and modes of governance: P1) The greater the inconsistency between critical contingency factors and a particular governance form (both in terms of the number of inconsistent factors and the extent to which these factors are inconsistent with characteristics of the governance form), the less likely that that particular form will be effective, leading either to overall network ineffectiveness, dissolution, or change in governance form. P2) Shared network governance will be most effective for achieving network-level outcomes when trust is widely shared among network participants (high-density, decentralized trust), when there are relatively few network participants, when network-level goal consensus is high, and when the need for network-level competencies is low. P3) Lead organization network governance will be most effective for achieving network level outcomes when trust is narrowly shared among network participants (low-density, highly centralized trust), when there are a relatively moderate number of network participants, when network-level goal consensus is moderately low, and when the need for network-level competencies is moderate. P4) NAO network governance will be most effective for achieving network-level outcomes when trust is moderately to widely shared among network participants (moderate density trust), when there are a moderate number to many network participants, when network-level goal consensus is moderately high, and when need for network-level competencies is high.

Propositions regarding the tensions in each governance mode: P5) Networks face a tension between the need for administrative efficiency and inclusive decision making. In shared-governance networks, the tension will favor inclusion; in lead organization-governed networks, the tension will favor efficiency; and in NAO-governed networks, the tension will be more balanced but favor efficiency. P6) Networks face a tension between the need for internal and external legitimacy. In shared-governance networks, the tension will favor internal legitimacy; in lead organization-governed networks, the tension will favor external legitimacy; and in NAO-governed networks, both sides of the tension will be addressed but in a sequential fashion. P7) Networks face a tension between the need for flexibility and the need for stability. In shared-governance networks, the tension will favor flexibility; in NAO- and lead organization-governed networks, the tension will favor stability.

Proposition regarding the evolution of the modes of governance: P8) Assuming network survival over time, as network governance changes, it is likely to evolve in a predictable pattern from shared governance to a more brokered form and from participant governed to externally (NAO) governed. Evolution from shared governance to either brokered form is significantly more likely than evolution from a brokered form to shared governance. Once established, evolution from an NAO to another form is unlikely (i.e., inertia is strongest when the governance form is more formalized).

Source: Provan, K. G., & Kenis, P. (2008). Modes of network governance: Structure, management, and effectiveness (p. 241). *Journal of Public Administration Research and Theory*, 18(2), 229–252.

This set of modes, key predictors and tensions reverberated positively in the studies of network governance, as evidenced by the fast growth in the number of citations received by the article since its publication in 2008. However, the impact of its propositions on the consolidation of the field of research had not yet been assessed. In the next section, the methodology that guided both this study and the procedures of the meta-study is presented.

Methodology

We decided to analyse the evolution of the research on network governance by means of a meta-study (Barnett-Page & Thomas, 2009; Dixon-Woods et al., 2005) supported on the theoretical propositions developed by Provan and Kenis (2008). We based this choice both on the aim of the article to structure the field of research and on its recent influence, which is denoted by the large number of citations it has received in the searched databases. We adopted two complementary approaches for the analysis of the articles that cite Provan and Kenis (2008). By means of the quantitative approach, we carried out an egocentric social network analysis (SNA) (Borgatti, Everett, & Johnson, 2013; Wasserman & Faust, 1994). And by using the qualitative approach, we concentrated on the articles that indicated an intent to further the propositions of Provan and Kenis (2008). The procedures of collection and analysis used with the two approaches are described below.

We initiated the collection of articles by limiting our research base to the Web of Science. The type of material (article) and the database (main collection of the Web of Science) were defined as limiting search parameters. Our search, carried out in June 2015, found 224 articles published between the years of 2008 and 2015. In order to understand how the homogeneity in the field (Borgatti et al., 2013; Mizruchi & Marquis, 2006) is established, we carried out an SNA using the ego network of articles that cite Provan and Kenis (2008) as a level of analysis. For the purposes of our study, ego networks were defined as networks consisting of a single actor (ego) together with the actors it is connected to (alters) and all the links among those alters (Everett & Borgatti, 2005). We organised a quadratic matrix with the 224 articles that cite Provan and Kenis (2008) and connected the citations between them in a binary fashion. We utilised the software Ucinet v. 6.5 to analyse the degree of centrality of the articles, treating the data as directional (Freeman, 1978; Marsden, 2002). And we utilised the software Netdraw v. 2.15 to graphically represent the result. The resulting random sociogram excluded many articles of the network because they neither cited nor were cited by the others. For this reason, said articles were excluded from its presentation. We adapted the visualisation of the results, making each node's size equivalent to its index of degree centrality in order to highlight the articles most referenced to in the ego network of Provan and Kenis (2008).

Through the qualitative approach, a selection of the articles that cite Provan and Kenis (2008) both in the introduction and in the discussion of results was carried out. This selection was based on two arguments key to the generation of relevant contributions to the subject: first, the problematisation put forward in the introduction should refer to one of the main issues raised by Provan and Kenis (2008); second, the discussion of results should provide an answer to the issue analysed, highlighting where and how the proposed contribution is presented. On the basis of these arguments, we postulated that articles that propose to further a

specific topic developed by Provan and Kenis (2008) ought to present the chosen topic in the introduction and demonstrate their contributions in the results.

This approach identified 37 articles, which were then distributed to the authors of this study for the reading and analysis of contents in accordance with meta-study procedures (Dixon-Woods et al., 2005). Each researcher organised in a table the advances made by each article along with its objectives, theoretical bases, hypotheses, propositions, methods, procedures, results, contributions, research directions and limitations. The analyses were presented and debated during the four meetings of alignment and selection. From the 37 read articles, just 10 were selected for in-depth analysis because only these articles effectively advanced the propositions presented by Provan and Kenis (2008). Although the remaining 27 articles have met the criteria abovementioned, they have not presented any theoretical advance to the original propositions. The small number of selected articles makes us aware about the large number of articles that cited Provan and Kenis (2008) only as a “ceremonial citation” (Webb & Weick, 1979). A ceremonial citation is one that cited Provan and Kenis (2008) but engaged in no discussion of their work in the theoretical argument or empirical analysis.

The map of the recent evolution in the field of network governance, the advances regarding the propositions of Provan and Kenis (2008) and the modes, contingency factors and tensions of governance will be presented next.

Results

The result of the SNA enabled the detailing of the network governance field stemming from the article of Provan and Kenis (2008). The influence of the article has grown since 2008, as it was to be expected. It received 3 citations in 2008; 11 in 2009; 22 in 2010; 26 in 2011; 43 in 2012; 39 in 2013; 52 in 2014 and 28 until July 2015. This means that 72.32% of the citations of the article occurred between 2012 and 2015, which demonstrates the snowball effect of its influence in a similar fashion to other contexts (Ellegaard & Wallin, 2015). The citation network comprises 103 of the 224 articles. This means that the remaining 121 articles cite Provan and Kenis (2008), but neither cite nor are cited by the other articles citing Provan and Kenis (2008). Thus, among the 103 articles that comprise the ego network of our study, 75 cite another article of the network, 41 are cited by other articles and 13 simultaneously cite and are cited by at least one of the 103 articles. Figure 3 illustrates the result of the connections between the 103 articles of the ego network.

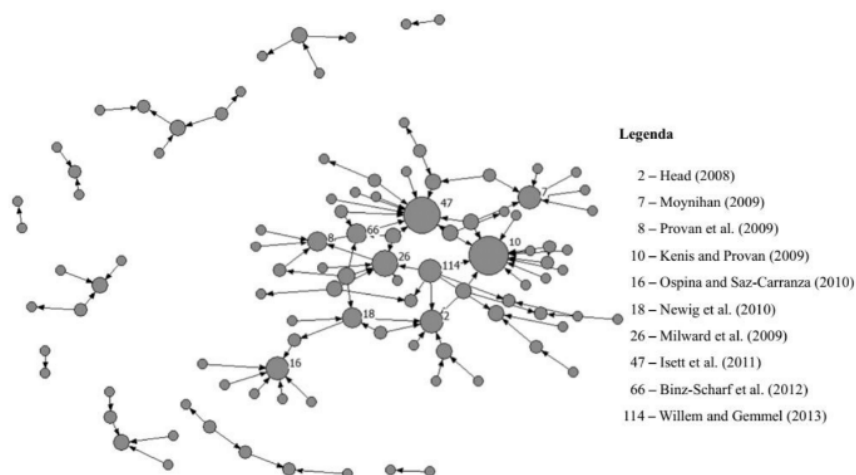


Figure 3.
Social network of reviewed articles

The result of the SNA indicates that the field of network governance has evolved in a scattered fashion, given the low density of the network formed ($D=0.002$). Conversely, considering the small group of articles relatively more cited and the connections between the articles that cite them and are also cited, it is possible to assert that the field stemming from the work of Provan and Kenis (2008) has advanced significantly on the path of the governance of both public institution and civil society arrangements.

This advance is made clear by the indices of degree centrality of the articles. Two articles stand out, as it is possible to see by the sizes of their nodes in Figure 3. The first one is an article from the same authors (Provan & Kenis, 2008) which furthers the topic of public network performance evaluation. The second is fruit of the Minnowbrook III Conference and it debates the challenges that public network scholars face in the field, contemplating both theoretical and methodological issues (Issett et al., 2011). The other nine highly interconnected articles in Provan and Kenis (2008) ego network, which also discuss the network governance of public institutions, were published in periodicals such as the *Journal of Public Administration Research and Theory* and the *Public Management Review* (Binz-Scharf, Lazer, & Mergel, 2012; Head, 2008; Milward, Provan, Fish, Issett, & Huang, 2009; Moynihan, 2009; Newig, Günther, & Pahl-Wostl, 2010; Ospina & Saz-Carranza, 2010; Provan, Huang, & Milward, 2009; Willem & Gemmel, 2013). Appendix 1 presents a synthesis of the most central articles in the ego network of Provan and Kenis (2008).

By means of the qualitative approach of our research, the 37 selected articles were analysed in search of evidence that indicated advances regarding the propositions of Provan and Kenis (2008). Of this set, only 10 articles effectively made contributions related to the modes of governance, critical contingency factors, tensions and evolution of governance. In this group of articles, the analysis of networks of the public

sector, such as policy networks, health care networks and crisis response networks also prevailed. These articles, much in the same way as the ones identified by the SNA, were published mainly in journals with emphasis on public administration such as the *Public Administration Review*, the *Journal of Public Administration Research and Theory*, the *Public Administration, Policy and Society* and the *Health Care Management Review*.

Some of these 10 studies expanded the comprehension of the governance modes proposed by Provan and Kenis (2008). Among them, Newig et al. (2010) verified that while networks with highly centralised governance are well suited for the efficient transmission of information, they are also less resilient in cases of abrupt changes. More recently, Duncan and Schoor (2015) extended the concept of shared governance to the context of distributed organisations. A distributed organisation is an organisation that works across temporal, geographic, political, and cultural boundaries. This was an actual contribution to Provan and Kenis (2008) because their concept was extended to a context in which it had not originally been considered.

Other authors decided on confronting the governance mode adopted by a given network with its effective characteristics (Binkhorst & Kingma, 2012). On the basis of the problems found in the analysed network, the study of these two authors concluded which other modes of governance would be best suited to deal with the reality of the network. In this same line, Howlett and Ramesh (2014) put forth the concept of “governance failures” to describe situations that arise when the essential requirements of a governance mode are not met or when a mode is fundamentally misaligned with the problem that it is meant to tackle. The results of these two studies also generate indirect contributions to the understanding of the critical contingency factors that have to be considered for the adoption of the governance mode best suited to each network, in accordance with Provan and Kenis (2008). A more specific contribution on this subject was presented by Ysa, Sierra and Esteve (2014). The authors verified, by means of a model of structural equations, that network management has a strong effect on network outcomes.

The tensions of governance were only addressed by three studies. In the first one, Casey and Lawless (2011) use governance tensions as a lens to observe a critical failure event in a food inspection network in Ireland. The authors concluded that the problems of the network were caused by communication failure resulting from the tension generated by the search for legitimacy. In the second study, Enqvist, Tengo and Bodin (2014) describe the functioning of a citizen network engaged in environmental issues in India. Their research showed that the activities of the network had been influenced by tensions between inclusiveness and efficiency, and between internal and external legitimacy. The results of these two studies reinforce the existence of tensions in governance – as foreseen by Provan and Kenis (2008) – and show the impact of said tensions on the effectiveness of networks. Furthermore, Saz-Carranza and Ospina (2010) identified a fourth tension (unity versus diversity) and showed that the

staff of network administrative organisations use three mechanisms to address this tension: bridging, framing and capacitating.

Finally, some of the studies also contributed for a better understanding of governance evolution. Provan, Beagles and Leischow (2011) examined how collaborative networks of health organisations are formed and evolve. Their results show how the emergence of the network and its formalisation into an NAO-governance structure occur through a process of coevolution. Provan and Huang (2012) analysed how whole networks evolve and whether distinct structures of relationship remain stable over time. The results demonstrate that the tangibility of the resources predicts the extension of interactions in the network, and that network performance increases as the control of resources becomes more centralised. The study of Moynihan (2009) presented results different from the ones foreseen by Provan and Kenis (2008) regarding the evolution of governance. The author analysed Incident Command Systems (ICS) – crisis response networks – in the USA and identified that ICSs alternate between more or less centralised forms of governance, consistent with the demands of the task. Network governance did not evolve gradually, as foreseen by Provan and Kenis (2008), but cyclically, changing rapidly in response to the environmental conditions that originated the tasks. Appendix 2 presents a synthesis of the contributions of these ten articles to the theoretical propositions of Provan and Kenis (2008).

Conclusions and Directions for Future Research

Provan and Kenis made a significant effort in attempting to organise the complex and diversified field of network governance and guide future advances and contributions. Our results revealed, however, that most of the articles that cite them only do it to refer to the term “network governance” or to indicate the mode of governance used by the researched networks. Even the articles that demonstrate centrality in this analysis did not advance consistently in proposing frameworks to analyze network governance. Contributions to the original proposal, identified in our meta-study, are limited to specific aspects of the modes, tensions, and evolution of governance. Strong emphasis was verified in the study of networks linked to the public sector, likely resulting from the publication of the original paper in a journal– the Journal of Public Administration Research and Theory – with this very orientation.

The joint analysis of the articles enables us to assert that, in spite of their growing influence, the ideas set forth in Provan and Kenis (2008) article have not yet produced the effect of consolidating the envisioned field. Three pieces of evidence support this affirmation: First, the results of the SNA reveal that most of the articles that cite Provan and Kenis (2008) do not form a dense co-citation network. This shows that the contributions of these articles are not strongly connected. Second, the works analysed qualitatively do not attempt to further the propositions introduced by Provan and Kenis (2008), indicating that the evolution of

research on network governance has not followed the path proposed by the authors. Third, the concepts developed by Provan and Kenis (2008) have received marginal attention, which can be an indication that their work serves as reference to subjects foreign to the concepts formulated by them. A fourth possible evidence of the non-consolidation of the field is the scarcity of works that oppose, question or offer alternatives to the propositions presented by Provan and Kenis (2008). Rather than signalling the consolidation of a field, the scarcity of criticism of a given work indicates that it did not invite a critical, in-depth examination. The absence of investigations of this type, common to other works that guide academic communities, also demonstrates the need for consolidation of the network governance field.

On the basis of the analyses carried out, we suggest topics that could contribute for advances in the field of network governance for future research. Regarding the forms of governance identified by Provan and Kenis (2008), there are still no studies on the existence of hybrid modes. Moreover, the pieces of research examined were concentrated upon the three modes of governance and their effectiveness. Other variables that could be affected by governance, such as inter-organisational learning (Mariotti, 2012; Verschoore & Balestrin, 2011), collaborative innovation (Dagnino, Levanti, Minà, & Picone, 2015; Howard, Steensma, Lyles, & Dhanaraj, 2015) and social innovation (Franz, Hochgerner, & Howaldt, 2012), were not considered. The literature was also practically silent regarding the effectiveness of governance by a lead organisation. We suggest, therefore, that studies enabling the expansion of the understanding of this governance mode be carried out. This gap in literature also raises the following question: could the State or public institutions act as lead organisations for public or public-private networks? If so, which similarities and differences would there be in relation to networks governed by lead organisations in the private context?

There is also scope for further investigation of the critical contingencies that determine the choice of the most effective mode of governance. The results of our research show that no integrative study testing the four factors indicated by Provan and Kenis (2008) in respect to the modes of governance was carried out. Thus, new questions such as the following can be raised: How are these four factors interrelated and do they affect the effectiveness of the network governance? Are there other contingency factors that explain the effectiveness of the modes of governance? Does the effect of these factors vary according to the form of the network? There is also a clear potential for research on network tensions. Our evidence indicates that these tensions have not been thoroughly addressed in the examined studies, deserving, therefore, more attention from researchers. Thus, we raise other questions to be studied: Do the three types of tension reveal themselves simultaneously in inter-organisational networks? Do governance tensions truly represent an obstacle for the effectiveness of the network? How can the negative effect of governance tensions on the effectiveness of networks be minimised?

Finally, we recommend that research in network governance be directed to more specific levels of analysis, with the detailing (and understanding) of the mechanisms that inter-organisational networks use to operationalise each of the three modes of governance. Research at this level of analysis can generate significant contributions for network governance, indicating how networks effectively implement a shared governance mode, a network administrative organisation or a governance by lead organisation. We believe that, as well as generating theoretical contributions, studies in this direction can bridge the gap between researchers and practitioners, indicating more specific manners of governing public and private networks and increasing their effectiveness. In view of the complexity of networks and their playing an increasingly important role in the most varied sectors, enhancing the comprehension of network governance remains a relevant challenge for the organisational field.

We also have to recognize some limitations of our study. Firstly, our research focused solely on articles published until July 2015. It is reasonable to believe that since then new studies have advanced with regard to the modes of network governance. We strongly recommend other researchers to analyse the studies that cited Provan and Kenis (2008) after 2015 and discuss the results they achieved. Second, the ego network approach on the article of Provan and Kenis (2008) is also a limitation of this study. In spite of the great relevance of their article for this subject, we recognise that research on network governance is developing beyond Provan and Kenis (2008) contribution. As we highlight in the introduction, there are different conceptions of governance and different conceptions of network that widen the possibilities of study in this field. However, the consolidation of a field of research is usually strengthened by articles that attempt, in one way or another, to organise it. Although the results of our research do not attest to such consolidation, the advance of knowledge in the area is undisputed, especially in respect to public network governance. Further research can apply different strategies to show how network governance subject path develops, such as bibliometric approaches, citation/co-citation analysis, meta-analysis and research synthesis. We hope that the results analysed here contribute to a better understanding of this topic and assist in directing future research.

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Appendix 1: Central articles identified by the SNA

Article	Objective	Object of analysis	Method	Contributions
(7) Hand (2008)	To offer alternatives for the assessment of public network performance	Public networks/governance networks	Theoretical essay	It criticizes the literature on the assessment of public network performance based on service outcomes and proposes an assessment based on the network processes and their relationships. It defines flexible forms of assessment of governance networks. ICNs alternate between more or less established forms of governance, consistent with the demands of the task. Network governance does not evolve gradually, as foreseen by Provan and Kenis (2008), but cyclically, changing rapidly in response to the environmental conditions that originate the tasks.
(7) Moynihan (2009)	To categorize networks of Incident Command Systems (ICS) regarding their organizational form and to identify how network characteristics influence their operations	Incident Command Systems (ICS), crisis response networks	Secondary data on crisis management such as the attack to the Pentagon, hurricane Katrina and urban fire in the USA	Network embeddedness is positively related to social indicators (trustworthiness, reputation and influence).
(8) Provan et al. (2007a)	It examines the relationship between network and social outcomes (organizational trustworthiness, reputation, and influence). It extends the work of Flaming and Provan (2007a)	Health and human services network	Quantitative longitudinal	It organizes the literature on the assessment of public networks and presents three emergent factors of assessment type of network governance, type of ecosystem, and developmental stage of the network.
(10) Kenis and Provan (2009)	To offer insights into the complexity of assessing the performance of public networks	Public networks	Theoretical essay	It demonstrates how the leaders of the coordinating units of emergency networks promote common objectives while stimulating collaboration by means of internal and external activities. By giving insufficient attention to internal and external activities, the leaders faced the tensions inherent to the contradictory interests of network collaboration.
(16) Oprea and Tac-Caraman (2010)	To understand how leaders of successful networks manage the challenges of collaboration.	Two successful urban navigation networks in the United States	Qualitative interpretative research with narrative inquiry	Characteristics of the network, such as density, centralization, or the strength of ties can have different effects on timing. Networks with highly centralized governance are well suited for the efficient transmission of information, but are also less resilient in cases of abrupt changes.
(18) Neway et al. (2018)	To defend the argument that "whether or not governance is conducted in networks makes a crucial difference" for the individual and collective learning and, indirectly, for the "quality" of governance outcomes	Networks in the field of environmental management	Theoretical essay	Although the two networks were governed by NGOs with distinct characteristics (a non-profit agency and a private firm), there were no significant differences in performance.
Mahward et al. (2007)	To verify if the sector, the level of trust between collaborating agencies, and differences in the structure and evolution of networks generate, over time, a variation in the performance level.	Two mental health care networks in the USA	Longitudinal study	It proposes four directions for research: to include contributions of other fields (sociology/anthropology), to approach technical disciplines such as statistics, to carry out case studies of network cases, and to seek greater involvement with practitioners.
(47) Irest et al. (2011)	The article is centered on the challenges that network scholars face in the discipline, discussed basic theoretical questions, knowledge of formal and informal networks and methodological issues	Governance networks	Theoretical essay	It identifies that the informal network is strong, but that it also has a powerful link to the existing bureaucratic structure (B1 possesses precise control). The informal network is based by this bureaucratic structure. Governance mechanisms (relational, contractual and hierarchical) appear to be complementary rather than substitutes (no conflict). Low levels of legitimacy or of relational governance seems to occur. It especially is less efficient networks.
(60) Ben-Scharf et al. (2017)	It examines when and how informal interpersonal networks emerge from the need for knowledge, and how public managers make use of these networks	Public sector networks	Interviews with 33 individuals from 10 government DNA labs	
(11) Witten and Gramrod (2013)	To explore the type and importance of governance structure and governance mechanisms for network effectiveness	22 health networks	Multiple case study	

Appendix 2: Articles that contributed for the discussion on Provan and Kenis (2008)

Article	Objective	Object of analysis	Method	Contributions
Paul et al. (2012)	To explore how the structure, the content and the governance of a network relate to its effectiveness	27 cases provides networks (refers to the networks)	The cases were selected to explore networks through documentation, interviews, observations, and a survey among network participants. To the extent possible, the effectiveness of the network was assessed in relation to the network's mission.	The study requires more research to explore the relationship of networks and their effectiveness. The effectiveness of the network needs to be assessed in other types of networks.
Yin et al. (2014)	To evaluate the effect of management strategies on the results of the networks	117 cases reported public policy networks in Spain	Survey with 241 individuals involved in the networks	Network management and trust directly affect network results. A leadership knowledge positively affects management and trust. Leadership negatively affects trust and does not affect management.
Shaw and Russell (2016)	To review the concept of governance and propose a framework that highlights the role played by network capacity and shape in the effectiveness of such tools	Governance networks	Theoretical essay	The article justifies the concept of "governance failure" which is useful to describe the situation that occurs when the network's management is not effective. The article also describes the concept of governance failure and its relationship with the network's management.
Bakker and Lange (2012)	To analyze how network capacity can be used to improve the quality of the policy network	Policy networks for social safety in the Netherlands	Case study of 10 networks with the network of organizations involved in the policy-making and implementation of social safety	Case study of 10 networks with the network of organizations involved in the policy-making and implementation of social safety. The study shows that network capacity can be used to improve the quality of the policy network.
Chen et al. (2013)	To assess governance in distributed organizations	Distributed case study organizations	Case study of 10 distributed organizations	Case study of 10 distributed organizations. The study shows that governance in distributed organizations is a complex process that involves multiple actors and actors.
Chen et al. (2011)	The paper addresses the question of how governance networks can be	Governance networks	Case study of 10 governance networks	Case study of 10 governance networks. The study shows that governance networks can be used to improve the quality of the policy network.
Boyer et al. (2014)	The paper describes a network structure, its governance, its performance, its benefits for the city's inhabitants	A network structure, its governance, its performance, its benefits for the city's inhabitants	Case study of 10 networks	Case study of 10 networks. The study shows that governance networks can be used to improve the quality of the policy network.
Provan et al. (2011)	How collaborative networks of local organizations are formed and evolve, especially in a local, community-based setting	NAAC case	Case study of 10 networks	Case study of 10 networks. The study shows that governance networks can be used to improve the quality of the policy network.
Provan and Ralston (2013)	2 analyses how whole networks evolve and what factors affect their structure of relationships over time, as well as the network's performance and degree of governance of the network	A network structure, its governance, its performance, its benefits for the city's inhabitants	Case study of 10 networks	Case study of 10 networks. The study shows that governance networks can be used to improve the quality of the policy network.
Shaw and Russell (2016)	The study aims to identify what activities the network participants perform to address the diversity of governance for the whole network	Policy networks for social safety in the Netherlands	Case study of 10 networks	Case study of 10 networks. The study shows that governance networks can be used to improve the quality of the policy network.

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