DETERMINANTS OF NETWORK OUTCOMES: THE IMPACT OF MANAGEMENT STRATEGIES

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The literature on network management is extensive. However, it generally explores network structures, neglecting the impact of management strategies. In this article we assess the effect of management strategies on network outcomes, providing empirical evidence from 119 urban revitalization networks. We go beyond current work by testing a path model for the determinants of network outcomes and considering the interactions between the constructs: management strategies, trust, complexity, and facilitative leadership. Our results suggest that management strategies have a strong effect on network outcomes and that they enhance the level of trust. We also found that facilitative leadership has a positive impact on network management as well as on trust in the network. Our findings also show that complexity has a negative impact on trust. A key finding of our research is that managers may wield more influence on network dynamics than previously theorized.

INTRODUCTION

The literature on complex network management is extensive; however, it generally explores network structures and their importance for public service delivery, neglecting the role of network management (Walker *et al.* 2007). For instance, the impact of management on network effectiveness has been examined on only a few occasions (Meier and O'Toole 2001; Klijn *et al.* 2010b). According to these authors, network management is highly relevant in complex networks, in which public, private, and non-for-profit sectors are involved.

This gap serves as our point of departure; 'if networking is a measurable and identifiable management practice, and if it appears in roughly similar forms in different countries, it should be possible to estimate its impact on performance in a wide range of settings' (O'Toole *et al.* 2007, p. 416). This article builds on this previous work and aims to answer the following specific questions: (1) What are the effects of network management strategies and trust on perceived outcomes? (2) Does active network management improve the level of trust in networks? (3) How do facilitative leadership and (4) complexity influence the relationships within networks? We based our questionnaire on an existing Dutch survey on network management (see Klijn *et al.* 2010a, 2010b). Our aim is to produce more evidence for their findings, from a country other than the USA or the Netherlands, where most studies of networks originate.

In order to answer the questions, we carry out a systematic empirical examination of one important policy sector: the urban revitalization of economically depressed areas. We do so by incorporating data from a large number of cases on action networks (Agranoff 2007) in Catalonia, Spain. These policies address long-standing issues in which many actors are involved. Our findings show that network management strategies have a strong effect on perceived outcomes and that management strategies enhance the level of trust. Our results also demonstrate that trust matters. The article offers an incremental contribution to the literature on network management by testing a general model to explain network performance.

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The next section outlines the state of current research on networks and public management and develops some potential empirical expectations derived from earlier scholarship. We then describe our research design and relevant data. The fourth section details the results of our empirical study, and we discuss the data gathered. The final section outlines the conclusions and implications of our study on network management.

THEORETICAL FRAMEWORK

The advantages of network coordination are considerable (Huxham and Vangen 2005; Provan and Kenis 2008; Considine 2013; Lenferink *et al.* 2013): enhanced learning, more efficient use of resources, an increased capacity to plan for and address complex problems, greater competitiveness, and better services for clients and customers. Accordingly, Agranoff and McGuire (2001, p. 323) expand this view by emphasizing that 'as it is now a core task of governance, network management must be placed up front as an essential arena of examination in the fields of public management and administration'. Embracing the view of these authors, we argue that the role of management is critical for effective network outcomes. Specifically, we examine management efforts to work in an interdependent setting to build support for programmes, attract partners in cooperative endeavours, and overcome the challenges presented by other actors.

To analyse the impact of network management on network outcomes we adopt Provan and Kenis's (2008, p. 231) definition of networks as 'groups of three or more legally autonomous organizations that work together to achieve not only their own goals but also a collective goal', focusing on those networks that develop policies and convert them into action. These networks are set up with a specific purpose, either by those who participate in the network or through mandate, and evolve largely through conscious efforts to enhance coordination.

Klijn *et al.* (2010b) recall that 'the basic argument is usually that without adequate network management strategies, it is very difficult, or even impossible, to achieve interesting outcomes in these complex networks'. The assumption is that a satisfactory outcome is often impossible without network management. However, in the network management literature there are still more theoretical questions than actual empirical research (Herranz 2008). Therefore, studies are needed to be able to measure network outcomes and performance (Agranoff and McGuire 2001).

Moreover, in accordance with the network literature, we also examine *trust* in the network. Management literature has widely recognized the existing link between trust and network outcomes (see, among others, Lane and Bachmann 1998; Huxham and Vangen 2005; Bachmann and Zaheer 2006). However, this stream of research has just started to be applied to public administration. For instance, Klijn *et al.* (2010b) provide an empirical study of networks and relate the levels of trust between network partners to the outcomes achieved by those networks. According to these authors, there is a positive relationship between trust among partners and network outcomes.

Another variable that we consider in our analysis is *facilitative leadership*. Ansell and Gash (2007) would include under this term the initial conditions and empowerment that serve as critical ingredients to bring the different parties to the table and to steer the network. Ansell and Gash assume that, even when collaborative governance is mandated, achieving 'buy-in' is still an essential aspect of the collaborative process.

Finally, we also examine *complexity*. O'Toole and Meier (1999) stress that networks experience more complex environments and more internal complexity than hierarchies of

similar size. Accordingly, we want to test how complexity contributes to the management challenges that arise from the uncertainties and complexities of the structurally ambiguous setting itself.

Network management strategies

Networking behaviour is important because managers and management can be expected to exert influence, especially within the network context (Walker *et al.* 2007; Alexander *et al.* 2011), and because the performance-related impacts of such managerial efforts have been shown to be significant (O'Toole and Meier 1999; Meier and O'Toole 2007; Klijn *et al.* 2010b). O'Toole and Meier (1999) and Herranz (2008) argue that management is more crucial in networks than in hierarchies because of its influence on organizational performance in terms of: (1) creating an organizational structure that contributes to system stability; (2) buffering an organization from environmental influences; and (3) exploiting opportunities present in the environment. Nevertheless, Ansell and Gash (2007) find in their meta-analytical study of 137 international networks that very few extant studies actually evaluate governance outcomes. Accordingly, *managerial strategy* patterns deserve more systematic attention.

We define network management strategies as the deliberate attempt to govern processes within networks (Klijn *et al.* 2010a) and assume that, once the network is in place, managers must still manage and lead the network because success is by no means assured (Provan and Kenis 2008). Managers can coordinate networks in a variety of ways and various management strategies have been identified in the literature (O'Toole and Meier 1999; Rethemeyer 2005). The most generally accepted approach is Agranoff and McGuire's (2001) proposition to construct a POSDCORB process for network management. According to these authors, there are apparent common network management behaviours that entail the following general tasks: activating, framing, mobilizing, and synthesizing. This approach has also been considered by other public management authors when analysing networks (Herranz 2008; Rethemeyer and Hatmaker 2008; Klijn *et al.* 2010b).

Activation/deactivation focuses on engaging the right participants in a network, identifying network participants, and tapping their resources. Framing includes shaping network interactions by establishing and influencing the network's operating rules, norms, and perceptions. It speaks to the cognitive and motivational components of network management. It involves giving shape to purposes, has great influence on the alignment of various forms of engagement, and introduces new ideas to the network in order to raise commitment to the joint undertaking. Mobilizing refers to the need for consistent participation and resource sharing throughout the network's lifecycle. It emphasizes human resource management in terms of motivating, inspiring, and inducing commitment among network participants and stakeholders. Finally, synthesizing refers to creating and enhancing the conditions for favourable, productive interaction among network participants. It focuses on developing the proper set of relations between the network participants by facilitating and furthering their interaction, reducing complexity and uncertainty, changing incentives, and engendering effective communications among participants to lower the cost of their interaction.

Beyond identifying these tasks, we want to discover how the set of managerial tasks network managers carry out have an impact on their quest for outcomes. As mentioned by Agranoff and McGuire (2001), management tasks are often used in combination. When network management is able to navigate all of these successfully, the precondition for successful collaboration can be achieved. Accordingly, we hypothesize:

Hypothesis 1: Network management has a positive influence on network outcomes.

Trust

Trust has been suggested to be a fundamental requisite in public networks (Provan and Kenis 2008). Ring and van de Ven (1992) identify two major conceptualizations of trust. The first understands trust as the convincement that a partner will behave as one expects. A second definition, by contrast, relies on the other's goodwill. Huang and Provan's (2007, p. 173) definition merges both conceptualizations by proposing that trustworthiness is 'the extent to which an organization can be depended on to honor its promises in an exchange relationship'. The literature suggests the importance of trust to broadly address others' concerns beyond the boundaries of specific, measurable transactions. Furthermore, more recent definitions of trust have emphasized the vulnerability that partner A has when relying on the intentions of partner B (Provan and Kenis 2008).

Despite the importance of trust in the development of networks, there is little empirical evidence on how trust affects network outcomes. One exception is presented by Klijn *et al.* (2010a), who assess how the levels of trust among network partners affect the outcomes of environmental networks. In their results, the authors report that trust has a positive impact on network outcomes. Arguably, the influence of trust in outcomes can be explained due to the fact that networks entail a high degree of uncertainty; therefore, without trust in the other partners, actors will not commit themselves to the development of a network. It seems, then, that to increase outcomes, networks have to enhance trust. According to this reasoning, we hypothesize:

> *Hypothesis 2*: Higher levels of trust in networks will lead to outcomes that actors in these networks perceive to be of higher quality.

Moreover, Ring and van de Ven (1992) imply that the emergence of trust is a dynamic process – one which can be managed. This is because the more frequently an organization interacts with other, different types of organizations, the greater the likelihood that it will increase its stock of information regarding the predictability or reliability of the different parties. In this same vein, Agranoff and McGuire (2001) argue that trust-based governance structures have rich, consultative institutional structures and suggest that, operationally, there are forces that build trust within networks.

Furthering this idea, Rethemeyer and Hatmaker (2008) argue that trust can be enhanced by communicating or exchanging information within the network partners. As the authors explain, once these ties among partners are well established, they become resources to foster knowledge of one another. Herranz (2008) emphasizes that the function of network management as a network integrator builds trusting relationships, and Provan and Kenis (2008) argue that a key role for those partners that act as network facilitators is to ensure that trust is built among network participants. This suggests that certain managerial actions can enhance the level of trust among network partners. Therefore, we hypothesize:

> *Hypothesis 3*: Network management has a positive influence on the development of trust. The level of trust in networks will be higher with more active network management strategies.

Facilitative leadership

Facilitative leadership (Ansell and Gash 2007), the initial conditions and empowerment that serve as critical ingredients to bring the different parties to the table and to steer the network, has been found to have a positive effect on network outcomes (Klijn *et al.* 2010b). We use the label *facilitative leadership* as a combination of concepts found in the literature such as 'role holding' and 'power to'.

Arguably, alliances are held together by strategic, operational implementation and assessment abilities, a form of steering that uses a catalytic leader or network manager to build a type of inter-organizational collaborative capacity (Agranoff and McGuire 2001). Agreeing with Agranoff (2007), Rethemeyer and Hatmaker (2008), and Provan and Kenis (2008), and contrary to the prevailing wisdom that networks are flat structures, we suggest that informal hierarchical aspects are an emergent property of public management networks. Rethemeyer and Hatmaker (2008) term this pattern of relations a role structure. An important consequence for our research is that roles are usually related to formal or informal grants of authority. Independently of its cause, we hypothesize that when the network management role is assigned, more managerial action can be developed inside the network, thereby acknowledging that multiple actors can engage in management efforts (O'Toole and Meier 1999; Rethemeyer and Hatmaker 2008).

Furthermore, according to Agranoff and McGuire (2001) and Rethemeyer and Hatmaker (2008), the ability to manage networks and mobilize mass constituencies is related to the internal support and cooperation of the manager's primary organization (what Considine (2013) calls the authorizing environment). Contrarily, weak commitment by public agencies to collaborate, particularly at the headquarters level, is often seen as a particular problem (Ansell and Gash 2007). Therefore, we hypothesize that, if the organizations' senior management is involved, more active network management strategies will be seen because managers will have the 'power to' (Agranoff and McGuire 2001); that is, they will have the power to ensure enough cooperation among disparate community elements to get things done and the power to mobilize slack resources, developing both strategies and trust. Five sources of power are critical in this respect: the power to mobilize, the power to organize, the power to strategize, the power to control information, and the power to exercise influence or authorize actions.

Accordingly, we hypothesize that facilitative leadership (active network management, appointed and visible network managers, and senior management involvement) matters with regard to trust and network management:

> *Hypothesis 4*: Facilitative leadership has a positive influence on developing trust in the network.

> *Hypothesis 5*: Facilitative leadership has a positive impact on active network management. It promotes system efficiency for managers to exploit opportunities when managing the network.

Complexity

There are several reasons why networks are complex settings. On the one hand they involve multiple parties operating with multiple interests (Verweij *et al.* 2013) – jurisdictional, organizational, sectoral – and on the other, they are aimed at both policy design and implementation. Networks are characterized by distributed authority, interdependent relations, blurred private and public boundaries, and competing and coexisting value systems (Herranz 2008; Klijn 2008). And while these constellations of partners may be potentially important as sources of funding, legitimacy, ideas, and guidance and they may have the potential to solve the integration and coordination problem, they are not without their own troubles (Huang and Provan 2007) and turbulence (Meier and O'Toole 2001).

From the literature (see, for example, Klijn 2008), the general proposition is that more management will be seen in more complex networks, and less trust will be generated in the network due to the different perspectives on the problems addressed and their solutions. Accordingly, we hypothesize:
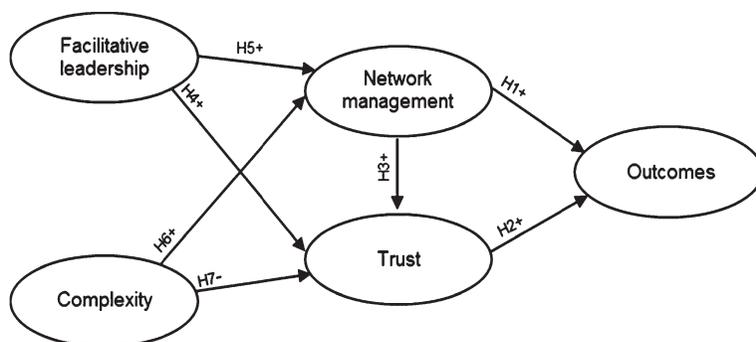
FIGURE 1 *Hypothetical path model*

Hypothesis 6: The greater the complexity in a network, the more complex its network management, *ceteris paribus*.

Hypothesis 7: Complexity has a negative influence on building trust. Network complexity may negatively affect trust.

The path model based on the seven hypotheses is shown in Figure 1.

RESEARCH DESIGN

Data collection

In order to analyse these theoretical questions, we conducted a web survey during the autumn of 2010. This survey targeted individual stakeholders involved in every urban renewal public policy network approved between 2004 and 2009 in Catalonia (Spain). Initially we had 148 networks, but because we dropped those approved in 2010 (because they were still electing their evaluation and monitoring committee), the final study focused on a total of 119. We collected data from 361 completed surveys from a target population of 1,025 individuals inside those networks, achieving a response rate of 35.22 per cent.

The unit of analysis in this article is the network. We consider the group of (inter-dependent) actors around urban projects as networks. Because of that, the performance questions are related to whole networks (Kilduff and Tsai 2003; Provan *et al.* 2007), and not to individual organizations operating within those networks. In order to assess the performance of the networks, we followed previous studies and asked the actors involved within each network about perceived network outcomes (Klijn *et al.* 2010a, 2010b).

The aim of the underlying policy was to integrate networks to transform urban areas that required special attention. These networks stemmed from a Catalan Regional Government programme to improve the most disadvantaged neighbourhoods, representing an investment of more than €990 million. The empirical context we examine consists of a set of similar networks in terms of their basic structural features: the same specific regulation, passed for this network, applied to them all; they are implemented in a relatively small geographical area, the same region, with 7.5 million inhabitants; all networks were approved in a competitive process, in six waves, between 2004 and 2009; their focus was urban renewal for the neighbourhoods, and 96 per cent of them developed a lead organization governance form.

The institutional architecture behind the programme's implementation was based on a network of agents, but there were two clear leaders: the Catalan Government's Ministry of Territorial Policy and Public Works, on the one hand, and the local town halls on the

other. Another important figure was the Evaluation and Monitoring Committee, with a separate committee created to monitor each of the specific Neighbourhood Plans. These committees were made up of representatives from the different affected Catalan government ministries, local government representatives, and civil representatives from the neighbourhood in question. Their functions were to establish coordination mechanisms, monitor the actions taken, and promote public participation (Parés *et al.* 2009).

Each year the regional government selected the neighbourhoods that would receive subsidies through a competitive process based on indicators (combining high scores regarding a neighbourhood's needs and project potentialities). The regional government financed 50 per cent of total budget (75 per cent in small municipalities with fewer than 10,000 inhabitants) and tracked and monitored network implementation processes. Autonomy was given to the local governments who, through networks in the neighbourhoods, shaped their outcomes. These networks were particularly complex because of the large number of actors involved (governments, local agencies, NGOs, network developers, and business leaders) and because of the interplay between different policy areas and the different values that would have to be reconciled in the decision-making process.

Although networks are conceptualized differently, there are characteristics that definitions have in common. Networks are characterized by complex policy problems that cannot be solved by one organization alone but require several actors who focus on developing collective actions that are sustained over time (Laumann and Knoke 1987; Kickert *et al.* 1997; Agranoff and McGuire 2001). Due to the nature of these interactions, a major characteristic of networks is that they show relatively high interdependencies between actors (Hanf and Scharpf 1978; Gage and Mandell 1990; Sørensen and Torfing 2007). Based on these characteristics, we can conclude that these networks match the criteria.

Regarding issue complexity, in the networks analysed 87 per cent of respondents state that 'their' project is related to other projects. And in 73 per cent of the cases, integral plans were developed (including social projects, urban planning activities, development of infrastructure, and improvement of services). The networks analysed also show strong interdependencies: 71 per cent of respondents state that they are strongly dependent on other actors within the network. And many actors are involved: 84 per cent of the respondents participate in a project involving more than five actors, and in 31 per cent of the cases more than 10 actors are involved. Regarding existence and stability over time, these networks show durability: 100 per cent of the networks, including preparation and implementation times, had durations of more than six years, and in 57.2 per cent of the cases more than eight years.

We based our web survey on an existing Dutch survey on network management, which has already been used as the basis for several other studies (see Klijn *et al.* 2010a, 2010b). The questions (in Catalan) were adapted item by item to the Catalonian context. We tried to keep the differences as small as possible, used multiple translators and pilot-tested translations in interviews.

To determine the final set of constructs and associated items underlying this study, we undertook several preliminary key steps. First, to check content validity for the various constructs and items derived from the literature, we conducted interviews with four practitioners from several organizations in our universe of study. The resulting discussions led to the refinement of our construct definitions and items and ultimately to the preparation of the questionnaire items and scales for our web survey. Second, we conducted a small pre-test (n = 10) of the resulting web survey to assess factors such as the clarity of its wording, the ease with which it could be completed, and the estimated completion time.

After these revisions were made, we deployed the final web survey in the autumn of 2010.

For the survey we obtained a list of networks from the regional government, using their 'Networks of neighbourhoods' mailing list. This is a large regional platform for developing and sharing knowledge within the winning urban projects in various areas in Catalonia. We updated this initial list thoroughly by contacting each municipality three times (twice by e-mail and once by phone), producing a final list of 1,025 individuals. The new names came from: the managers of the three departments of the regional government in charge of the networks; the members of the evaluation and monitoring committees in each network (neighbours, NGOs, businesses); and updated information about local government managers in the networks. Building this census was time-consuming and a collaborative effort with the networks themselves, which carried out the final check.

Our respondents thus represent the different organizational backgrounds of actors in networks around complex urban projects, including the region and municipalities, executive agencies, contractors, project management organizations, academic experts, neighbours, and businesses. Each of the respondents received an e-mail giving access to the online survey. A total of 361 questionnaires (35.22 per cent) were returned, 19 of which were incomplete and were withdrawn. For the final analysis we used data from 342 individuals. The individuals in the sample come from a wide variety of organizations, bringing different backgrounds to the analysis, including the regional government (5 per cent), local town halls (68 per cent), public executive agencies (8 per cent), private organizations (2 per cent), and not-for-profit organizations (6 per cent), among others.

Measurement development

Dependent variable
The dependent variable in our study was the perceived network outcome. The literature on network outcomes acknowledges the complexity that measuring these outcomes entails (Agranoff and McGuire 2003; Meier and O'Toole 2007). A well-accepted operationalization of this construct is considering not only the content of the outcomes but also the process that leads to the final results (Koppenjan and Klijn 2004; Klijn *et al.* 2008; Provan and Kenis 2008; Klijn *et al.* 2010a, 2010b), or what Skelcher *et al.* (2005) have termed *substantive and procedural societal goals*.

In keeping with these studies, we assessed each construct item using 5-point Likert-type scales, ranging from 1 (totally disagree) to 5 (totally agree) to be able to develop a single scale for the outcomes measure. The list of specific survey items is provided in the Appendix (table A1).

Explanatory variables
As argued in the first part of this article, the *network management strategy* adopted to develop a network may have an important effect on the outcomes that the network can achieve (Klijn *et al.* 2010a, 2010b). Public administration scholars focusing on networks have referred to several managerial strategies. We use the comprehensive classification provided by Klijn *et al.* (2010b), which encompasses the following major managerial strategies: activating actors, setting process rules, and finally, connecting and exploring content. These strategies were measured through a subset of items using 5-point Likert-type scales. Moreover, in accordance with the literature on networks, we also considered *trust* in the network. As reflected in table A1 in the Appendix, we applied the same

methods used by these authors and examined the trust variable with several measures to form a main single scale (see Klijn *et al.* 2010b, for an in-depth explanation).

Another variable that we considered in our analysis was *facilitative leadership*; this, understood as the initial conditions and empowerment that serve as critical ingredients to bring the different parties to the table and to steer the network, has been found to have a positive effect on network outcomes (Klijn *et al.* 2010b). In our survey, this variable was assessed through several items concerning network management and using scales of 1 (I completely disagree) to 5 (I completely agree).

The final explanatory variable of our study refers to the *complexity of the networks* undertaken by the networks. We asked respondents if they would characterize their network environment as 'complex' (many actors, relations, etc.). In addition, we also considered other items such as how much respondents depended on the other parties to achieve their goals or how different the opinions on the networks' direction were among the different network members (see table A1 in the Appendix for a full description).

Control variables

In order to test the effects of the explanatory variables, we also included several control variables considered in previous research on network outcomes (Klijn *et al.* 2010a, 2010b). The first is the *network phase* – the developmental stage of each network. This was assessed by asking the respondents the current stage of their network, based on a subset of seven different activities (ranging from analysis of the plan's feasibility and (economic) consequences to the final evaluation report). We also assessed the *number of actors* that were involved in the network, as it may be the case that those networks with more actors obtain more benefits of managerial actions.

The position that the respondents held in the network could also affect how outcomes were perceived. Thus, we asked the respondents their *role in the network*, differentiating those who held managerial functions from those who did not. In addition, the literature on public networks acknowledges that having an identifiable leader is also related to the success of the network (Meier and O'Toole 2003; Silvia and McGuire 2010); therefore we also considered whether the respondent was *currently the network leader*.

Finally, we controlled for the *years of experience* respondents had in urban renewal networks. Arguably, respondents with more experience could have a different perception of the outcomes achieved in these networks as they could compare them to the success or failure of previous networks in which they had also participated.

DATA ANALYSIS AND RESULTS

In order to simultaneously assess the measurement model and determine the effects of network management and trust on perceived outcomes as a function of complexity and facilitative leadership (figure 1), we employed the partial least square (PLS) approach to structural equation modelling using Smart PLS 2.0 (Ringle *et al.* 2005). This component-based approach is founded on a set of multiple regressions to estimate the presence of relationships in the structural model. It is an iterative algorithm that separately solves the blocks of the measurement model and then, in a second step, estimates the path coefficients in the structural model.

Measurement validation

The factor loadings of the items with their respective constructs reached the commonly applied threshold of 0.70 (table 1). A total of five items (v42 and v46 for the Trust

TABLE 1 *Descriptive statistics and reliability of measurement items*

Construct	Item	Mean	SD	Factor loadings
Perceived outcomes	V25	3.82	1.02	0.83
	V26	3.50	0.87	0.78
	V27	3.78	0.87	0.76
	V28	3.74	0.82	0.84
	V29	3.76	0.87	0.84
	V30	4.06	0.90	0.90
	V31	3.66	0.95	0.87
	V32	3.68	0.83	0.82
	V33	3.31	1.32	*NA*
	V34	3.60	0.87	0.83
	V35	3.46	0.98	0.85
	V36	3.89	0.77	0.85
Trust	V37	6.90	1.51	0.80
	V38	3.55	0.88	0.72
	V39	6.97	1.80	0.85
	V40	7.10	1.60	0.72
	V41	5.95	1.77	*NA*
	V42	6.73	1.61	0.64
	V44	3.74	0.76	0.88
	V45	3.24	0.87	*NA*
	V46	3.55	0.83	0.65
	V47	3.33	1.03	*NA*
	V48	3.80	0.79	0.87
Network management strategies	V57	3.40	1.16	0.87
	V58	2.35	1.11	0.66
	V59	3.67	1.14	0.85
	V60	3.71	0.89	0.80
	V61	3.84	0.85	0.79
	V62	3.80	0.82	0.75
	V63	3.82	1.00	0.83
	V64	3.91	0.88	0.85
	V65	4.05	0.88	0.83
	V66	3.73	1.02	0.79
	V67	3.75	0.99	0.83
	V68	3.17	0.98	0.79
Facilitative leadership	V53	4.08	0.96	0.81
	V54	4.25	1.03	0.77
	V55	3.82	1.09	0.60
	V56	3.80	1.11	0.70
Complexity	V18	3.66	1.09	0.76
	V19	2.40	1.13	0.75
	V20	3.84	0.99	0.64
	V22	2.44	1.07	0.79
	V23	3.42	1.01	0.78
	V24	2.61	1.12	0.76

TABLE 2 *Construct correlation, composite reliability, Cronbach's alpha, and AVE*

	Cronbach's alpha	Composite reliability	AVE	1	2	3	4	5
1. Complexity	0.62	0.80	0.68	0.82[a]				
2. Facilitative leadership	0.71	0.83	0.65	−0.04[b]	0.81			
3. Outcome	0.85	0.93	0.87	−0.10	0.64	0.93		
4. Network management	0.80	0.87	0.63	0.02	0.65	0.75	0.79	
5. Trust	0.83	0.89	0.67	−0.23	0.58	0.76	0.64	0.82

[a]The square roots of shared variance between the constructs and their measures are provided in the diagonal (in bold).
[b]Off-diagonal elements are the Pearson correlations between the different constructs.

component; v58 for Network management; v55 for Facilitative leadership; and v20 for Complexity) had a factor loading value between 0.60 and 0.69, thus not fulfilling the threshold mentioned. That notwithstanding, these items were kept in our analysis as they have been widely used in public network literature, providing evidence on the reliability of the individual items. Due to not matching the minimum standards required, items 33, 41, 45, and 47 were not considered in the analysis. The constructs exhibited adequate inter-item reliability (Fornell and Larcker 1981; see composite reliability values in table 2). Cronbach's alpha was slightly smaller than the 0.70 threshold only in the case of Complexity. Nevertheless, we decided not to exclude this construct from our analysis because it addresses an important topic in network outcomes.

Our results provided evidence of convergent validity in three key ways. First, all items loaded positively and significantly on their respective constructs (table 2). Second, all constructs exhibited composite reliabilities of 0.80 or higher (table 2). Third, as a rule of thumb, the average variance extracted (AVE) should be greater than 0.50 (Fornell and Larcker 1981; Chin 1998). The AVE for all our constructs easily exceeded this threshold value (table 2). The AVE is also used to evaluate discriminant validity. The square root of the AVE for each construct was greater than all other cross-correlations (table 2), thus providing evidence for the distinctiveness of the constructs. The principal components' factor analysis loadings (table 1) further established this discriminant validity; all items had high loadings in their respective constructs with low cross-loadings in the others.

Common methods variance

Self-reported survey studies with a common grade are susceptible to common methods variance (CMV). A number of remedies were used in the design of the questionnaire to overcome potential respondent biases associated with self-reports (Podsakoff and Organ 1986; Podsakoff *et al.* 2003). For example, to reduce the likelihood that respondents would 'edit their responses to be more socially desirable, lenient, acquiescent, and consistent with how they think the researcher wants them to respond', we guaranteed the respondents' anonymity (Podsakoff *et al.* 2003).

To control for priming effects, we also segmented the questions pertaining to the predictor and criterion variables into different sections of the survey. Note that these variables were derived from different scale anchors or formats. The items measuring network management were placed in a different section of the questionnaire from those measuring trust and complexity. In addition, a survey piloting process improved many survey questions, thus reducing the likelihood of item ambiguity and evaluation
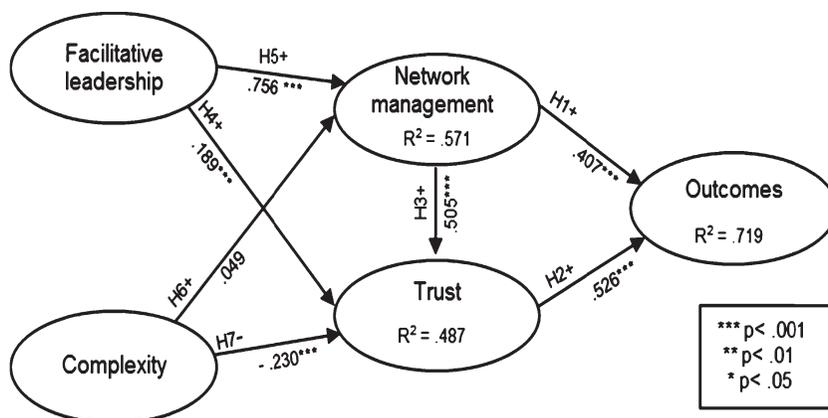
FIGURE 2 *Approved path model (calculation with SmartPLS)*

TABLE 3 *Parameter estimation (calculation with SmartPLS)*

Hypotheses		Original sample	Sample mean	S.E.	T statistics	p-value
H1	Network management ⇒ Outcome	0.4072	0.4067	0.0462	8.818	0.0000
H2	Trust ⇒ Outcome	0.5264	0.5269	0.0447	11.767	0.0000
H3	Network management ⇒ Trust	0.5052	0.5037	0.0669	7.555	0.0000
H4	Facilitative leadership ⇒ Trust	0.1887	0.1884	0.075	2.5151	0.0061
H5	Facilitative leadership ⇒ Network management	0.7564	0.7563	0.0312	24.2717	0.0000
H6	Complexity ⇒ Network management	0.0488	0.0413	0.0406	1.2017	0.1150
H7	Complexity ⇒ Trust	−0.2299	−0.2293	0.0623	3.6891	0.0001

apprehension (Tourangeau *et al.* 2000). Such 'procedural remedies' to control method biases made it difficult for the respondents to link the various measures together, particularly as the survey was fairly long.

Testing the structural model

The standardized path coefficients associated with the structural model are provided in figure 2 and table 3. Our model exhibits adequate predictive validity, as it explains 71.9 per cent of the variance in outcomes. Of the variance in network management, 57.1 per cent is explained by the main effect of facilitative leadership and complexity. For trust, 48.7 per cent of the variance is explained by the moderating role played by network management and by the main effect of facilitative leadership and complexity. Recall that Hypothesis 1 posits that network management has a positive influence on performance. The PLS results provide empirical support for six of the seven hypotheses. All regression coefficients are in the predicted direction and significant, with the exception of the relationship between complexity and network management (Hypothesis 6).

   In detail, we found support for Hypothesis 1, which predicts not only a positive relation between network management and outcomes, but also that the higher the magnitude of network management, the more positive the outcomes. In the networks discussed here, both organizational goals (content outcomes) and network-level goals

(process outcomes) guide organizational actions. These goals might include attracting new network members, finding broad funding mechanisms, addressing community needs, or improving services. Network goals may also be process-oriented, like working to reduce competition or conflict among participants. Consistent with work by Provan and Milward (2001) on domain similarity, when there is general consensus on broad network-level goals regarding content and processes, network participants are more likely to be satisfied with outcomes.

In line with previous research (Klijn *et al.* 2010b), the results indicate that the level of trust has a significant effect on the degree of perceived outcomes, supporting Hypothesis 2. Trust, then, is a necessary condition for better perceived outcomes. Furthermore, there is evidence that the degree of active network management strategies influences the intensity of trust (Hypothesis 3). Hypothesis 3 is thus supported: network management has a positive influence on trust. Trust in renewal networks is higher if managers take managerial actions in the network. These results support the work of Ring and van de Ven (1992), pointing to the crucial role that informal, socially embedded personal relationships have in producing stable relations based on trust among formally independent organizations. More active network management will develop enhanced trust.

Hypothesis 4 is supported: facilitative leadership has a positive impact on trust in the network. That is, intense steering activity builds trust in the network to reach outcomes in renewing destitute areas.

Hypothesis 5 is supported: facilitative leadership has a positive impact on management efforts to exploit opportunities when managing the network. In practical terms, managers can develop a more strategic focus when the network is intensely managed. This confirms previous work by Ansell and Gash (2007). The implications of interdependence can sometimes be counterintuitive. Highly antagonistic stakeholders who are also highly dependent upon each other may move towards successful collaborative processes. Contrarily, stakeholders with a foundation based on trust and shared values may fail when collaborating because the stakeholders may find it easier to achieve their goals unilaterally if alternative venues exist. When stakeholders are highly interdependent, a high level of conflict may actually create a powerful incentive for collaborative governance.

Hypothesis 6 is not supported. Results demonstrate no significance between complexity and management efforts. We interpret that this is because active network management is carried out knowing that the issue at stake is complex, and thus does not have an impact on the perceptions of the individuals surveyed. They understand the complexity of the task that is actually being undertaken and they can speak very knowledgeably on the topic. This assumes, *a priori*, that public network management is especially complicated when managers must coordinate networks involving organizations from the non-profit and for-profit sectors (Herranz 2008). Consequently, network managers acknowledge that they are challenged to coordinate organizations that may have different interests, motivations, and responses to incentives and disincentives.

Hypothesis 7 is supported: complexity has a negative impact on building trust. Accordingly, the more complex the network, the less trust is developed inside the network. Network actors are thus sensible to the complexity of the network when evaluating the capacities that the other actors have in dealing with difficult problems.

Regarding the control variables, we find that being the leader of the network has a positive effect on facilitative leadership, network management, trust, and perceived outcomes, but not on complexity. The same applies for the number of actors in the network. Arguably, those networks with more actors show a higher relation between

network management and perceived outcomes. None of the other control variables was found to have any significant effect on the constructs of our model.

In the article we simultaneously assess the measurement model and determine the effects of network management and trust on perceived outcomes as a function of complexity and facilitative leadership. In sum, the extent of facilitative leadership has an impact on the level of network management strategies (Hypothesis 5) and on trust (Hypothesis 4). Consequently, these two relationships reveal the indirect influence of complexity on the level of outcomes (Hypotheses 1 and 2). Complexity's negative impact on trust (Hypothesis 7) results in an indirect influence on outcomes as well.

CONCLUSIONS

In the network literature there are a great number of articles theorizing the relationships between network management strategies and outcomes, and trust and outcomes. But there is very little empirical evidence that confirms the theory in practice. The present study assesses the effect of core management concepts on network performance, providing empirical evidence from several Catalan networks.

The article is based on theory-driven empirical research. Through the use of structural equation modelling we test several hypotheses about network management, trust, network complexity, and 'facilitative leadership'. In our article, we go beyond current work by testing a path model and considering the interactions between the constructs. We have also built a single factor for the different items that compose the dependent and independent variables instead of, for example, summing the number of strategies used.

Finally, the article offers an incremental contribution to the literature on network management by testing a general model to explain network performance. Our aim is to produce more evidence for their findings, from a country other than the USA or the Netherlands, where most studies of networks originate.

The results of our analysis are encouraging regarding the importance of management for network outcomes. First, our findings are consistent with previous work examining the relationship between network management and outcomes (Klijn *et al.* 2010b) and the strong correlation between trust and outcomes (Klijn *et al.* 2010a).

Second, the findings from our structural model demonstrate a strong relationship between the two variables – network management strategy and trust – which both impact on the perceived outcomes. We also found that facilitative leadership has a positive impact on network management as well as on trust in the network. Our findings also show that complexity has a negative impact on trust. The non-significant results regarding the impact of complexity on network management, however, are contrary to our hypothesis.

Organizations join or form networks for a variety of reasons, including the need to gain legitimacy, serve clients more efficiently, attract more resources, and address complex problems (Provan and Kenis 2008). Until recently, little systematic research had been dedicated to public-managerial impacts (Meier and O'Toole 2001; Klijn *et al.* 2010b). Our study provides a test on a path model that explicitly links managerial actions, trust, facilitative leadership, and complexity in networks with assessments of perceived outcomes. Management appears to interact with other organizational resources in a non-linear manner to further boost organizational performance (Meier and O'Toole, 2001). A key finding of this research is that managers may wield more influence on network dynamics than previously theorized (Herranz 2008). A key contribution we hope to make is to develop a theoretical rationale for network management that can predict the

successful achievement of network-level outcomes (Provan and Kenis 2008) or of what some have referred to as *network effectiveness* (Provan and Milward 2001).

A great deal of the research on networks and networking thus far concentrates on one or only a few cases. The results of our study open the possibility that diverse variables can be explored systematically using a large number of cases. Furthermore, we examined outcomes as a multi-dimensional variable in a large-scale network study. From a management perspective, our work demonstrates that effective network management requires recognition of and response to network complexity, and also the intense management of needs, outcomes, and trust. We believe that we have made a case for a reasonable fit between the hypothetical path model of network outcomes and our large-number quantitative study on the urban renewal policy in Catalonia.

Our study has some limitations. The first is that it incorporates data from a large number of cases. In so doing, our analysis sacrifices valuable rich detail about particular managers and managerial contexts but gains generalizability across a fairly broad number of governance circumstances. In this sense, future studies should incorporate the perspective of the social network analysis literature to address how the characteristics of the network – the structure, actors, and the ways in which they interact, among others – influence the relationship between network management and network outcomes.

A possible research path to follow in order to bridge the gap and show how variables affect each network differently is a comparative analysis of cases. This was done for the urban renewal programme subject of our study through a qualitative comparison of eight cases in Parés *et al.* (2009). These authors concluded that, despite the fact that all the cases were based on the same public programme promoted at the regional level, the programmes were quite different locally in terms of their governance models and the content of the renewal policies being promoted.

Our results must be regarded as preliminary; they are drawn only from a specific national setting. Still, within these limits, the findings confirm the view that managerial networking has an impact on outcomes. Comparative research studies should be conducted internationally to identify the patterns and how they relate to political cultures.

Overall, this study assesses the effect of core management concepts on network performance, providing empirical evidence from several Catalan networks. Our study notes the significance of management for network success, but more importantly, it reinforces a line of research in which several questions remain to be addressed.

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APPENDIX

Table A1 summarizes the items of the dependent variables and all the explanatory variables included in our analysis.

TABLE A1 *Summary of dependent and explanatory variables*

Variable	Nature	Item	Authors
Outcome	Dependent	*Content outcome*	Skelcher *et al.* (2005); Ansell and Gash (2007); Provan and Kenis (2008); Edelenbos *et al.* (2010); Klijn *et al.* (2010a, 2010b)
		V25. Do you think that innovative ideas have been developed during the project?	
		V26. Do you think that the various aspects of the problem were sufficiently integrated?	
		V27. Generally speaking, do you think that the various stakeholders in the network have contributed to achieving results?	
		V28. Do you think that the solutions developed are sufficient to address the problems?	
		V29. Do you think that the developed solutions will be long-lasting?	
		V30. Do you think that the benefits of this cooperation outweigh its costs?	

TABLE A1 *continued*

Variable	Nature	Item	Authors
		Process outcome	
		V31. Do you think that the various stakeholders have contributed substantially to the network's management?	
		V32. Do you think that conflicts and differences of opinion have been resolved satisfactorily?	
		V34. Do you think that the various stakeholders' different perspectives were used to solve problems?	
		V35. Do you think that the various stakeholders had frequent contact with one another during the project?	
		V36. Do you think that the network stakeholders will approve of the results?	
Network management strategies	Explanatory	*Exploring*	Agranoff and McGuire (2001); Ansell and Gash (2007); Herranz (2008); Rethemeyer (2005);
		V60. In this network, special attention has been paid to sharing diverse points of view.	Rethemeyer and Hatmaker (2008); O'Toole and Meier (1999); Walker *et al.* (2007)
		V61. During the collection of information, emphasis was placed on establishing starting points and common informational needs.	
		V62. A satisfactory amount of time was spent on communication among the various parties.	
		Connecting	
		V63. The network leaders consulted with the people who carried it out. Decisions were made collectively.	
		V64. The network leaders took into account existing interpersonal relationships, their bases, and how they were generated and developed.	
		V65. When deadlock was reached or problems arose, management tried to find common ground between the positions of the conflicting interests.	
		Arranging	
		V57. Groups of public stakeholders are involved through platforms for negotiation and debate.	
		V58. Groups of private companies are involved through platforms for negotiation and debate.	

TABLE A1 *continued*

Variable	Nature	Item	Authors
		V59. Civil-society groups are involved through platforms for negotiation and debate. *Process rules* V66. In this network, explicit agreements were reached about how to organize cooperative efforts (project groups, management groups, etc.). V67. The agreements regarding this network consciously envisaged the possibility of diverting from the established plan in the event that it proved advantageous to do so. V68. Parties were enabled to abandon the network if necessary to protect their own interests.	
Trust	Explanatory	V37. How would you rate the overall degree of trust between the various parties involved in the network? V38. Since you became involved in the network, has the degree of trust in the cooperative effort . . . ?: decreased a lot, decreased, remained the same, increased, increased a lot How would you rate your level of trust in the other network stakeholders? V39. (Other) local public stakeholders; V40. (Other) departments of the Catalan government; V42. (Other) social groups/actors of civil society. V44. Generally speaking, the parties to the network have fulfilled their agreements. V46. The parties to the network take into consideration the other parties' interests. V48. The parties are able to assume, in principle, that the other actors involved have good intentions.	Powell (1990); Ring and van de Ven (1992); Milward and Provan (2003); Ansell and Gash (2007); Klijn (2008); Provan and Kenis (2008); Klijn *et al.* (2010a)
Facilitative leadership	Explanatory	V53. The network was actively managed (the various parties were called to meetings, a meeting agenda was followed, the various parties were coordinated, the content of the project was managed, etc.). V54. A network director has been appointed and is visible to all the parties involved.	Agranoff and McGuire (2001); Agranoff (2007); Ansell and Gash (2007); Rethemeyer and Hatmaker (2008).

TABLE A1 *continued*

Variable	Nature	Item	Authors
		V55. Multiple individuals are involved in managing the network.	
		V56. Senior management teams in the different organizations are also involved.	
Complexity	Explanatory	V18. I would characterize my network's environment as complex (many actors, relations, etc.).	Klijn (2008); Provan and Kenis (2008).
		V19. In my network's environment, there is a lot of criticism about this project.	
		V20. The project is connected to a lot of other projects.	
		V21. In this network, I greatly depend on other parties to achieve my goals.	
		V22. In the network, parties have significant differences of opinion about the network's direction.	
		V23. In the network, there is strong emphasis on learning from others' experience and insights.	
		V24. Many unexpected events and changes have taken place in the network.	

For further information on how these variables build from previous literature, see Klijn *et al.* (2010a, 2010b).