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## **The influence of trust on network performance in Taiwan, Spain and The Netherlands: a cross country comparison**

Erik Hans Klijn, Vicenta Sierra, Tamyko Ysa, Evan Berman, Jurian Edelenbos & Don Chen

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### **Abstract**

Governance networks are generally seen as a vehicle for dealing with complex societal issues, and in such networks trust is seen as an important condition that enhances information exchange and learning among actors, thereby improving network performance. In this article, we use survey material collected in three countries, Taiwan, Spain and The Netherlands, to explore hypotheses about trust enhancing network performance. Empirical analysis shows positive relationships between the level of trust and network performance. We also find that the number of network management strategies has a positive association with both network performance and trust. Our supplemental analysis also shows a positive relationship between the level of trust and output legitimacy.

## 1. Introduction: trust as condition for network performance

A mantra of modern public administration theory is that many decision-making processes, including service delivery and implementation processes, take place within complex networks (Hanf and Scharpf 1978; Marsh and Rhodes 1992; Kickert, Klijn and Koppenjan 1997; Rhodes 1997). Governance networks are defined as “more or less stable patterns of social relations between mutually dependent actors, which cluster around a policy problem, a policy program and/or a set of resources and which emerge, are sustained and are changed through series of interactions” (Klijn and Koppenjan 2015: 11). Crucial to the emergence and existence of networks are dependency relations among actors (Hanf and Scharpf 1978). Resource dependencies around policy problems or policy programs require actors to interact with one another and create more intensive and enduring interactions (Mandel 2001; Agranoff and McGuire 2003). At the same time, actors with different perceptions about problems may choose different strategies, thereby making interactions less predictable and more complex (Rhodes 1997; Agranoff and McGuire 2003).

### *Trust as an important network characteristic*

Achieving good network outcomes is not always easy, since governance networks are characterized by autonomous actors who choose their own strategies which, at the same time, are interdependent. (Klijn and Koppenjan 2016). Given complexity in network interactions and coordination difficulties, and limited possibilities to achieve coordination by contracts and organizational arrangements, trust has been mentioned as a characteristic that would enhance network performance. Trust, as many authors in mainstream organization studies note, reduces uncertainty, facilitates information exchange and learning and brings stability to relations all factors that enhance the performance of (strategic) alliances between firms (see Ring and van der Ven 1992; Deaking and Michie 1997; Sako 1998; McEvily and Zaheer 2006). This facilitates cooperation, reduces transaction costs and stimulates learning and innovation (e.g., Lane and Bachman 1998; Nooteboom 2002; Huxham and Vangen 2005). However, trust is surely not always present and thus must be cultivated and cherished such as through network management (Lane and Bachman 1998; Mandel 2001; Meier and O'Toole 2007; McGuire and Agranoff 2011; Ysa, Sierra and Esteve 2014).

Trust is a growing research theme in network literature to describe and explain collaborative processes in governance networks (Provan, Huang and Milward 2009; Provan and Kenis 2008; Huxham and Vangen 2005; Edelenbos and Klijn 2007; Ansell and Gash 2008). There is some evidence in network research that trust is beneficial for network performance (Provan, Huang and Milward 2009; Klijn, Edelenbos and Steijn 2010), but empirical studies on trust are still very scarce.

This study adds to insights and conclusions that trust matter for network performance (Klijn, Edelenbos and Steijn 2010), and we also examine how network management influences trust.<sup>1</sup> This study investigates these relationships across three countries: Taiwan, Spain and The Netherlands. Our research question is, “*What is the influence of trust in networks around spatial planning projects in Taiwan, Spain and The Netherlands, on network performance and how is this relationship affected by network management strategies.*” We use survey research involving respondents in governance networks around spatial planning projects in these three countries to explore these relations.

Section 2 formulates a conceptual model and explore why trust is important to achieving good network performance. We formulate hypotheses about trust, network management and

network performance. Section 3 addresses our data collection and operationalization of the variables. Section 4 presents main findings. To analyze the influences of these variables simultaneously we use structural equation modeling. We finish with conclusions and reflections in Section 5.

## 2. Why trust would be important in networks: a theoretical framework

### *What is trust?*

Trust is defined in many different ways in the literature. Before discussing the impact of trust, it is essential to clarify the range of what can be considered ‘trust.’ Key characteristics of trust that emerge from the literature are the aspects of risk and vulnerability to opportunistic behavior that is involved (Zucker 1986; Rousseau et al. 1998; Ring and van der Ven 1992).

When an actor trusts another actor, (s)he is taking a risk, allowing him/herself to be vulnerable to opportunistic behavior. When trust has developed, each actor expects other actors to refrain from opportunistic behavior, even when the opportunity for it arises (Deakin and Michie 1997; Lane and Bachman 1998). (S)he assumes that the partner will take their interests into account in achieving goals, but he is not fully certain about it (Rousseau et al. 1998; Nooteboom 2002). A conscious choice has to be made to take a risk, and this usually done with the belief that the other party can be trusted. With this in mind, we define trust as (Rousseau et al. 1998 and Edelenbos and Klijn (2007): *actors’ more or less stable, positive perception of the intentions of other actors, that is, the perception that other actors will refrain from opportunistic behavior.* As the definition highlights, trust is a perception about intentions. It can thus also be distinguished from institutional characteristics such as rules and norms, which often serve to facilitate trustworthy behaviors. Trust can further be distinguished from actions that are the result of trust. Though trust and actions are mutually related, trust develops ‘in’ action, or to put it more precisely, in interactions among actors (Ring and van der Ven 1992; Lane and Bachman 1998). For example, trust may develop when an actor communicates openly about his intentions, or when an actor hands over particular responsibilities, or when actors work together on a project without exploiting each other’s vulnerabilities. Without interactions, trust will easily diminish (Rousseau et al. 1998; Nooteboom 2002).

### *Why trust is beneficial for network performance*

An important argument in the literature about trust is that it stimulates the exchange of information and knowledge. Access to knowledge increases problem solving capacities of governance networks through the ‘bundling’ of knowledge sources (e.g., different fields of expertise. Huxham and Vangen 2005; Provan, Huang and Milward 2009). Knowledge is partly tacit and sometimes only available in the form of human capital (Nooteboom 2002) which often require intensive and repeating interactions among actors. Trust, as discussed above, can facilitate these interactions. A similar observation is made about learning (Lane and Bachmann 1998). Learning and discovery, too, require knowledge exchange and intensive interaction, and trust plays an important role in these types of interactions, for example causing trusting actors to be more open towards each other (Zand 1972), which facilitates learning processes (Miles and Snow 1986; Ring and van der Ven 1992; Parker and Vaidya 2001).

Most of the literature on governance, governance networks and collaborative governance (Ansell and Gash 2008; Innes and Booher 2003) emphasizes the importance of trust for reducing transaction costs (see also Huxham and Vangen 2005) and for increasing learning processes in which actors not only exchange information but also learn from each other specific solutions that satisfy their interests (Ring and van der Ven 1992; Schon and Rein 1994; Provan and Kenis 2008). There exists scant empirical research on trust in networks, and that which does seems to suggest positive effects of trust among actors in governance networks on network performance (Provan, Huang and Milward 2009; Klijn, Edelenbos and Steijn 2010; Willem and Lucidarme 2014).

### *Developing and sustaining trust*

Many authors argue that trust grows gradually and is sustained by trustworthy behavior of actors. Some speak of a “trust cycle” in which more interactions lead to an inclination among actors to trust each other, which in turn leads to more interactions (Huxham and Vangen 2005). This generates a gradual process of trust building (Rousseau et al. 1998; Huxham and Vangen 2005). As trust develops during interactions (Provan, Huang and Milward 2009), it can be argued that trust can be fostered and managed, though the management of trust is itself indirect as trust cannot be directly created or enforced. Managers can only facilitate certain behavior, and create conditions that facilitate the development of relationships (Klijn, Steijn and Edelenbos 2010). Network management includes the deliberate governing and facilitating of interactions in the network (Agranoff and McGuire 2003; Meier and O'Toole 2007; Provan, Huang and Milward 2009), and since network management aims to bring actors together, increase their interactions, and stimulate the development of common perspectives, network management is thus thought to have a positive effect on trust building (Ansel and Gash 2008; Huxham and Vangen 2005). Moreover, because network processes are complex, the network literature also emphasizes that different network management strategies and considerable effort is needed deploying these different strategies (see McGuire and Agranoff 2011; Klijn and Koppenjan 2015). Thus, we hypothesize below that intensive and active network management may result in increased trust within networks.

The literature discusses an impressive number of types of network management strategies guiding interaction processes (Gage and Mandell 1990; Mandell 2001; O'Toole 1988, Agranoff and McGuire 2003). Four categories can be distinguished (Klijn, Steijn and Edelenbos 2010): connecting, exploring content, arranging, and process agreements.

Connecting strategies, such as the activation of actors or resources, are required in order to start the game. The network management literature stresses that the network manager has to identify actors required for any initiative and create a situation in which they become interested in investing their resources (Scharpf 1978). The interactions within the game also must be managed. This can be done by appointing a process manager, who invests time and energy in connecting the actions and strategies of actors to one another during interactions. Once the game has begun, strategies for exploring content are necessary to clarify the goals and perceptions of actors (Fischer 2003; Klijn and Koppenjan 2015) and there is an urgent need to invest time and money in developing solutions that create opportunities for actors' participation. However, the process sometimes fails to produce creative solutions that satisfy the various actors. In such cases, more ideas about possible solutions are required, for instance by using different teams of experts. The managerial strategy of arranging involves setting (temporary) structures for consultation, interaction and deliberation, such as project organization, communication lines, etc. (Rogers and Whetten 1982). Another important strategy mentioned in the literature is process agreements that create temporary sets of rules

for interaction to structure the interactions and protect each actor's core values (Klijn and Koppenjan 2015). The rules can be seen as basic rules for behavior and interaction in the network that the actors in the network (explicitly) agreed on.

Although network management is probably one of core concepts of network theory, to date not much empirical research digs into this apart from case studies (McGuire and Agranoff 2011). The well-known Texas district research (Meier and O Toole 2007) is actually neither about networks nor network management, but, rather, it looks at organizational performance of schools (and thus measures organizational performance not network performance) and on networking behavior of network managers (but does not identify specific strategies). So, research that looks at network management strategies and which links it with trust is very valuable in our opinion.

#### *Hypotheses about trust: the conceptual model*

Given the previous theoretical arguments, one would expect trust to be positively related to network performance. But one would also expect a positive relationship between the (number of) employed network management strategies and both the level of trust and network performance. The number of employed strategies informs about the variety of network management strategies that are used and is an indication of the effort of the network manager(s).

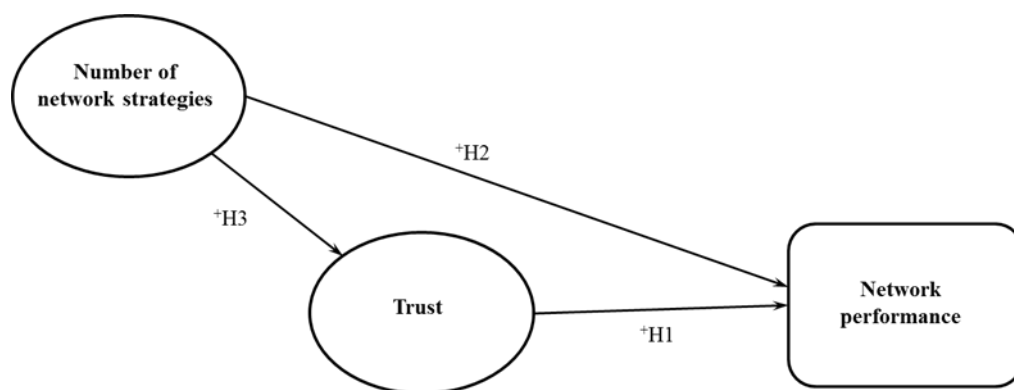
This study has three hypotheses:

Hypothesis 1: A higher level of trust will lead to increased network performance.

Hypothesis 2: A larger number of network management strategies employed will lead to increased network performance.

Hypothesis 3: A larger number network management strategies employed will lead to increased trust.

**Figure 1 presents the conceptual model tested**



### 3. Methodology

#### 3.1. Sampling and data collection in the three countries

In our research, the unit of analysis is the network, and we consider the group of (interdependent) actors around spatial planning projects as the network. The survey defines for respondents that “all the different actors (people, organizations) together are defined in this survey as the network around the project.” At the start of the survey, each respondent is asked to identify a specific spatial planning project that he/she was most involved in, and survey questions repeatedly instruct, and are phrased in ways, for respondents to answer questions with regard to ‘their’ specific spatial planning project.

The survey explicitly asks about characteristics of the network (size, interdependency, level of conflict, etc.). The measure of network performance relates to the whole network (Provan, Huang and Milward 2009) rather than individual organizations operating within these networks. Our (perceptual) measures of network outcomes follow those of past studies (Provan and Milward 2001; Klijn, Steijn and Edelenbos 2010). Indeed, we based our questionnaire on previously conducted survey research on network management (Klijn, Steijn and Edelenbos 2010).

#### *Projects surveyed*

Survey data were collected (N=678) from three countries: Taiwan (n= 225), Spain (n=257) and the Netherlands (n=196). The Dutch survey was administered mid-2010, and the Taiwanese and Spanish surveys were conducted June-September 2011. Survey questions were adapted item-by-item to the three settings. We used multiple translators and pilot-tested translations in interviews to a try to avoid different cultural perceptions of items.

The testing of our theories in three different settings goes beyond the conventional practice of testing in only a single locale. Most survey research on networks in public administration and management comes from the US or the Netherlands, and comparative data on networks (and network management) in different countries is very scarce. Testing across three countries is also a more severe test of hypotheses as they are tested in different contexts. Our three countries are typical examples within three broad categories of North European, South European and Asian countries that have been identified as having different administrative styles (Meyer and Hamerschmidt 2010, Skelcher et al. 2011; Berman, Moon and Choi 2011).<sup>ii</sup> While these are different contexts indeed, this study does not set out to explain comparative differences, nor are country differences part of any main study hypothesis, stated above.

We surveyed individual participants of organizations in the governance networks.<sup>iii</sup> Trust is formed by individuals (within certain organizations in the network) in their interactions with other individuals (in other organizations). We wanted to capture that specific character: that trust is formed by individuals but in a context of relations among organizations. So, we asked the respondents about the trust they had in other parties in the network (which implies individuals but individuals who are embedded in other organizations). We discuss some variety in the type of networks in each country below.

The networks in the Netherlands are water management projects in urban settings. These water networks are geographically dispersed over The Netherlands. In these networks, general issues related to water safety and storage are combined with other spatial problems and issues related to housing, infrastructure and urban regeneration. Thus, the deliberate aim of these projects is the integration and combination of several spatial functions.

Regarding Spain, the survey targeted individual stakeholders involved in every urban regeneration public policy network approved between 2004 and 2009 in Catalonia (Spain). The aim of the underlying policy was to integrate intervention networks to transform urban areas requiring special attention. These networks stemmed from a Catalan regional government program to improve the most-disadvantaged neighborhoods.

Taiwanese respondents were selected from five departments related to environmental policy and urban development (Department of Economic Affairs, Department of Urban Development, Department of Environmental Protection, Department of Public Works and Department of Transportation), in the five largest metropolitan cities. The Taiwanese networks cover a broad and diverse range of urban regeneration purposes such as pedestrian and bicycle pathways, redevelopment of specific urban locations (downtown, transportation hubs, etc.), and projects related to air and water quality.

Although the projects differ across the three countries - it would be impossible to find the same projects in three different countries -, all projects share a focus on spatial planning that involves a combination of issues of public infrastructure, social policy, environmental issues, and water management. That is why we include all under the heading of “spatial planning.” These projects are particularly complex because of the large number of actors involved including different levels of governments, agencies, private companies and civil society.

In The Netherlands, we obtained 874 e-mail addresses of people who participate in projects by utilizing the ‘Living with Water’ mailing list. The list incorporates practitioners from government, NGO’s, water boards, project developers, and builders. They had three main backgrounds: (1) national civil servants (11%); (2) local civil servants (29%); and (3) private sector respondents (48%). In Spain, the survey targeted individual stakeholders involved in every urban regeneration public policy network approved between 2004 and 2009 in Catalonia. Most respondents were public officials from local town halls (68%), regional government (5%) and public executive agencies (8%), while only 8% were from nonprofit or other private organizations. The Taiwan survey used a purposive or snowball sampling methodology, as no list or network of such projects exists. Contact persons were designated in each city through personal connections, and permissions were acquired for conducting interviews in these cities. Respondents in the Taiwan were mostly division managers (Taiwan civil service grade 9-10) who have experience in program management.

### *Network characteristics*

As previously stated, we considered the set of (interdependent) actors around the spatial planning projects as the network (and this is also how many of the questions were addressed to the respondents). The projects and networks we looked at in the three countries have many characteristics of networks mentioned in introduction section to this article:

a) *Many actors*. Respondents state that the networks in which they are involved contain a large number of actors. In The Netherlands, 90% of respondents participate in a project with more than five actors involved, and 53% of respondents state that more than 10 actors are involved. In Spain, respectively 84% and 31% of respondents involve these number of actors. However, in Taiwan, only 39% of respondents participated in a project with more than five actors, and 20% of respondents state that more than 10 actors were involved. Taiwan projects involve fewer actors.



b) *Durability over time*. In The Netherlands, on average, these spatial projects last ten years, whereas in Spain projects took a little longer than six years and in Taiwan projects take about five years.

c) *Interdependency*. In both The Netherlands and Spain, the majority of the respondents indicated that actors in the network were highly dependent of each other (Netherlands: 77%, Spain: 71%). No information is available for Taiwan.

### 3.2. *Questionnaire design and measures. The variables of the model operationalized.*

In this study, we focus our attention on three types of variables: the level of trust, the number of network managerial activities and the dependent variable: network performance. All indicators were measured using a five-point Likert scale, from 1=strongly disagree to 5=strongly agree.

*Trust among network actors*. Building on literature from general organization studies (as not much useful literature in public administration is available on trust among organizations), we used two items both related to the intentions of actors, as this is the core of the trust concept. Thus, our measure only looks at intentions and not at actions (which would be the result of trust!). Good intentions (the second item) directly measures whether actors believe the intentions of the other actors are good and is derived from Sako (1998) and other authors (Nooteboom 2002; Rousseau et al. 1998). Reliability (in trust) is related to a certain consistency of the intentions, and we borrow this from McEvily and Zaheer (2006: 88) who call it “the degree of consistency in intended behavior and the expectation that an exchange partner can be relied on to fulfill obligations.” For this to happen, actors need to take others’ intentions into account in their behavior and thus be aware of those intentions and act upon them. Thus, we operationalize reliability as knowing and acting with others’ intentions in mind.

**Table 1. Measurement of level of trust between actors**

Dimension	Code	Item
1. Reliability	REL	The parties in this project keep in mind the intentions of the other parties
2. Goodwill trust	GDW	Parties in this project can assume that the intentions of the other parties are good in principle

*Network performance*. Network performance is the crucial dependent variable, but measuring network performance, especially in spatial projects, is very difficult. There simply are no objective measures available to measure network performance,<sup>iv</sup> in part because actors have different perceptions about the desirability of outcomes. A newly realized neighborhood may be a good outcome for the municipality but a bad outcome for the environment group in the network that opposes it, and there are many such examples (Provan and Milward 2001). In network theory, most authors argue that performance measurement is related to the way actors succeed in achieving joint solutions that are of interest to a large number of actors in the network (Provan and Milward 2001; Skelcher and Sullivan 2008; Klijn and Koppenjan 2016). Our measurement using different perceived performance indicators tries to capture this character of network outcomes. We measure network performance using four items by Dutch researchers that have been validated in other research (Edelenbos, Klijn and Steijn 2010; Klijn, Steijn and Edelenbos 2010; Ysa, Sierra and Esteve 2014). These items are presented in Table 2.

**Table 2. Measurement of network performance**

Performance	Code	Items
1. Integral nature of solution	INT	Do you think that the various aspects of the problem were sufficiently integrated into project plans?
2. Involvement of actors (content)	INV	Generally speaking, do you think that the various stakeholders in the project have contributed to achieving results?
3. Effectiveness solutions	EFF	Do you think that the solutions developed are sufficient to address the problems?
4. Sustainability in the future	SUS	Do you think that the developed solutions will be long-lasting?

*Number of network management strategies employed.* The use of network management strategies is measured using eleven items on 5-point Likert scale in all countries. We used items developed from earlier research involving a validated scale (Klijn, Steijn and Edelenbos 2010; Ysa, Sierra and Esteve 2014). The items are shown in Table 3.

**Table 3. Items for measuring network management strategies**

Network management strategy	Items
Arranging (creating temporary organizational arrangements)	1. Groups of public stakeholders are involved through platforms for negotiation and debate
	2. Groups of private companies are involved through platforms for negotiation and debate
	3. Civil-society groups are involved through platforms for negotiation and debate
Exploring (looking for solutions and available information)	4. In this project, special attention has been paid to the sharing of diverse points of view
	5. During the collection of information, emphasis was placed on establishing starting points and common informational
Connecting (binding and connecting actors to each other, and enhancing interactions)	6. The leaders of the project consulted with the people who carried it out. Decisions were made collectively
	7. The leaders of the project took into account existing interpersonal relationships, their basis, and how they were generated and developed
	8. When deadlock was reached or problems arose in the project, the management tried to find common ground between the positions of the conflicting interests
Process rules (temporarily rules to facilitate interactions)	9. In this project, explicit agreements were reached about the organization of the cooperation (project groups, management groups, etc.)
	10. The agreements for this project consciously envisaged the possibility of diverting from the plan, in the event that it proved advantageous to do so
	11. Parties were enabled to abandon the project if necessary to protect their interests

The measure ‘number of employed network management strategies,’ is constructed by first dichotomizing these items. Scores 1 through 3 are recoded as zero, and the scores 4 (agree) and 5 (strongly agree) are recoded as 1, since only these scores are considered as stating that a strategy is actually present in the project.<sup>v</sup> Second, we sum these scores (following Klijn, Steijn and Edelenbos 2010), resulting in a score from 0 to 11 that aggregates the number of network management activities *actually* implemented in the project according to respondents.

#### *Measurement assessment and cross-national applicability<sup>v</sup>*

We did several tests to address the adequacy of the reflective scales (i.e. “trust among network actors” and “network performance”) and also tested for cross-national applicability in terms of configurational invariance between countries. The analysis and results of all tests are extensively reported in the appendix of this manuscript.

Overall, the measurement model results provide support for both convergent and discriminant

validity with satisfactory levels of construct reliability. The results of the generalizability analysis (via the decomposition of the different sources of variation and the evaluation of the generalizability coefficient) support the configurational invariance of the scales across the three countries.

#### 4. Data analysis and results

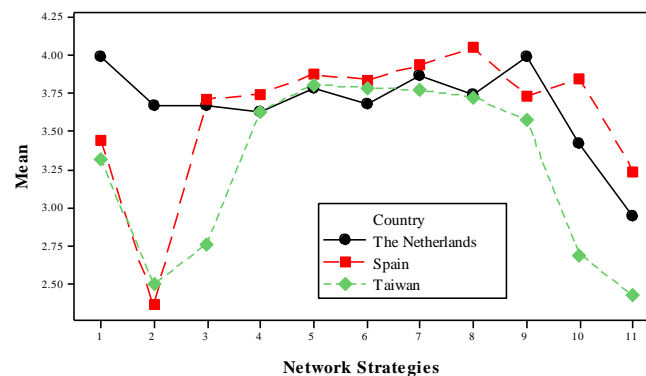
Before analyzing the relations between the variables involved in study hypotheses, we first explore some differences and similarities of findings across the three countries.

##### *Level of Trust and network management strategies in three countries*

The level of trust mean scores by country show that the Taiwan ( $M = -.24$ ;  $SD = .86$ ) is lower than the Netherlands ( $M = .06$ ;  $SD = 1.02$ ) and Spain ( $M = .17$ ;  $SD = 1.02$ ). The overall statistical test for differences between means shows significant differences ( $F\text{-test} = 9.01$ ,  $p < .001$ ) among countries. The post-hoc multiple comparisons tests highlight significant differences between Taiwan and The Netherlands ( $p < .012$ ), Taiwan and Spain ( $p < .001$ ), but does not suggest statistical differences between the Netherlands and Spain ( $p = .53$ ).

Figure 2 shows the mean scores of the use (from 1 to 5) of each of the 11 management strategies across the three countries. The differences arise in strategies 1 to 3 and less so in the last three, the process design strategies. Regarding the first two strategies, both belonging to the “arranging” type, The Netherlands is clearly different from the other two countries. Especially the second strategy (“Groups of private companies are involved through platforms for negotiation and debate”) is much more frequently used in the Netherlands. The process design strategies are used less in Taiwan.

**Figure 2: network management strategies in three countries**

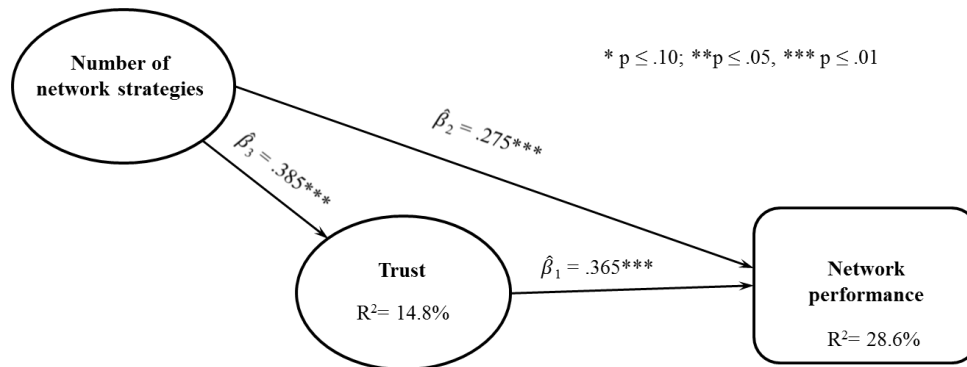


##### *Exploring the relationship between trust, network management strategies and perceived network performance*

In this study, we used the Partial Least Square (PLS) approach to structural equation modeling using Smart PLS 2.0 (Ringle, Wende and Will 2005). The PLS estimation is based on a set of multiple regressions and is an iterative algorithm that in a first step solves the blocks of measurement models and then estimates the path coefficients in the structural model. This is considered a soft modeling approach in which no strong assumptions (with respect to distributions, sample size, and measurement scale) are required. A bootstrap procedure was used to obtain the path relationships (standardized regression coefficients) and t-statistics to evaluate the significance of the parameters estimation for our hypothesized model shown in Figure 1.

Results in Figure 3 (whole sample) and in Table 4 (whole sample and country subsamples) provide support for all our hypotheses. Considering the results for the whole sample, trust has a positive influence on network performance ( $\hat{\beta}_1 = .365$ ,  $p = .00$ ), which is also the case for the number of network management strategies ( $\hat{\beta}_2 = .275$ ,  $p = .00$ ). These strategies also have a strong positive effect on the level of trust ( $\hat{\beta}_3 = .385$ ,  $p = .00$ ). Our model explains 28.6% of the variance in the network performance.

**Figure 3. Results from the research model (whole sample)**



**Table 4. Parameter estimation**

	Whole Sample		The Netherlands		Spain		Taiwan	
	Beta Coeff.	Standard Error	Beta Coeff.	Standard Error	Beta Coeff.	Standard Error	Beta Coeff.	Standard Error
<b>H1:</b> Trust → Network performance	.365***	.035	.419***	.062	.450***	.045	.275***	.063
<b>H2:</b> Network management strategies → Network performance	.275***	.035	.228***	.066	.410***	.047	.227***	.064
<b>H3:</b> Network management strategies → Trust	.385***	.035	.410***	.065	.381***	.058	.292***	.062
R² %	28.6		30.6		51.2		26.3	

\*  $p \leq .10$ ; \*\*  $p \leq .05$ ; \*\*\*  $p \leq .01$

The model and our findings suggest that the number of network strategies and the trust level among actors may influence network performance in two ways: both directly and indirectly (i.e., when the number of strategies precedes trust level). In other words, this implies that the relationship between the number of strategies and network performance could be mediated by the level of trust among actors.

Table 5. Mediation effect: bootstrapping					
Mediator	Indirect effect		Effect Size ( $f^2$ )	R² %	
	Standardize coefficient	95% CI		Full model	Without mediator
Level of trust	.14*	[.12; .15]	.154	28.6%	17.6%
(*) Sobel test statistic = 7.57 $p < .05$					

Indirect effect analysis was performed via a bootstrapping procedure using 1,000 samples (Table 5). The standardized indirect effect of network management strategy on network performance through trust level between actors was .14, and the 95% bias-corrected bootstrap confidence interval is between .12 and .15. As the direct effect from network management strategy to network performance controlling for the mediating variable is also significant, trust level between actors is seen to be a partial mediator.

## 5. Conclusions and reflections

As mentioned in the introduction, there are not many studies on networks and network processes using comparative research, and there is also not much research that looks at the relationship between trust, performance and network management.

Despite the differences between the three countries, we do find a clear general pattern in the data of the three countries. We find a significant relationship between trust and network performance, as well as between network management and network performance in all three countries. We also find that trust has a significant indirect mediation effect on network performance. We think that finding this across three countries is strong contribution to the network literature.

We also do find differences between the countries. The number of employed network strategies is larger in the Netherlands and lowest in Taiwan, and the effect of trust on performance is also lower in Taiwan than in Spain and The Netherlands. While cultural differences were not part of our survey, it is possible that such differences might underlie this finding. Hofstede's well-known scores on cultural differences (with indexes for power distance, individuality, masculinity, long term orientation and uncertainty avoidance) differ considerably between these countries (see Hofstede and Bond 1998). Specifically, Taiwan scores higher on Hofstede's power differences than The Netherlands (and Spain but less so), much lower on individualism than both other countries, and is characterized by strong long term orientation. Taiwan is a highly collective Confucian society where hierarchical order is much more important than in The Netherlands (and also Spain). In a more collective society, trust might be a bit less important to respondents because there is greater acceptance of hierarchical order that may not require trust to the same degree. However, this is speculative since our data do not contain issues on cultural variation.

Of course, our research also has some limitations. We already mentioned that items were presented in three different native languages, which, although we tried to avoid this, may have caused distortions in answering the questions. For this reason, we tested the cross-country applicability or equivalence measurement, and our results show that the items (variables) were considered in an equivalent way by respondents from the three countries. There are also differences in the networks we studied in the three countries, despite the fact that we tried to keep them comparable by selecting spatial planning projects. Another limitation is that network performance is measured by four items that are perceptions of respondents.

Within these limitations, we believe we have developed more generalizable insights and conclusions about relationships between trust network management and network performance.

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### ***Appendix A: Expanded model: Analysis with output legitimacy as extra variable***

In recent years, there has been increasing concern about problems with common method bias in public administration research, and worries that often-proposed tests cannot reliably detect its presence, but rather that it should be analyzed on theoretical grounds given the nature of the survey questions (Conway and Lance 2010; Jakobsen and Jensen 2015). This is also the opinion of this journal.

Our original analysis included output legitimacy as well as the variables we present in the manuscript. The editorial board considers that this variable created concerns for common method bias on theoretical grounds, because of a likely response set influencing answers both to the output legitimacy (independent variable) and the network performance (dependent variable) questions. Thus we present these results in this appendix only for interested readers. Therefore, this appendix aims at covering the analysis of our original hypothesized model that include the output legitimacy variable as a mediator between the numbers of network strategies and the network performance. After some theoretical considerations motivating the inclusion of the output legitimacy, the appendix illustrates the main results regarding methodological aspects such the measurement assessment, the cross-national generalizability analysis and common method bias test. In the final section we discuss the results, contrasting them with previous literature.

#### *Output legitimacy as relevant variable*

The studied variable “trust” is also found to be associated with the legitimacy of decisions (Edelenbos and Klijn 2007). Legitimacy involves a generalized preparedness to accept, within a certain margin, a decision (Luhman 1975). Legitimacy can derive from many sources, such as the procedures that have been followed, the effectiveness of decisions, the fact that decisions are being taken by certain institutions, etc.

In classic democratic theory, legitimacy stems mostly from input notions such as the ex-ante arrangement or positions and accountabilities, and not how the process afterwards is organized (Held 2006). Scharpf (1997), however, has argued that one can make a distinction between output and input legitimacy. By output legitimacy, Scharpf means the willingness to accept decisions because these produce good outcomes to the actors. Thus, legitimacy does not only emerge because procedures are followed but also because actors feel the outcomes are satisfactory, can be accepted, or at least can be tolerated.

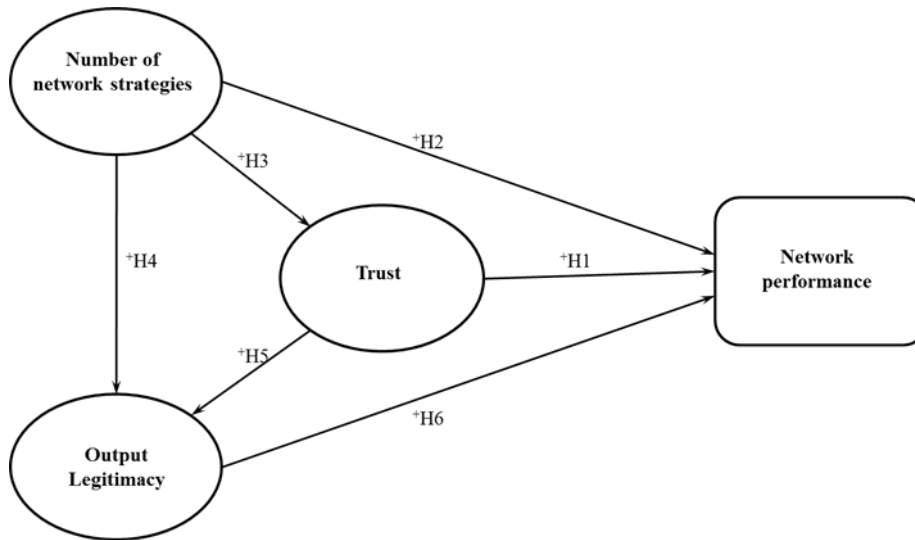
If actors in a governance network trust each other, they will have more productive interaction processes to reach decisions, in which actors acknowledge each other’s interests and values. In this way they will contribute to the output legitimacy of decisions coming from governance networks. Actually, an important aim of employing network management is not only activating actors and drawing them into the process but also enhancing their acceptance of outcomes, since reaching outcomes is dependent on actor's preparedness to invest their resources (Mandel 2001; Agranoff and McGuire 2003; Klijn and Koppenjan 2015). Thus, output legitimacy can have a positive relationship with trust and network management performance (Scharpf 1997; Mandel 2001). This leads us to the three extra hypotheses compared to the main text of the article (see Figure A1):

Hypothesis 4: More employed network management strategies will lead to higher level of output legitimacy.

Hypothesis 5: A higher level of trust will lead to higher output legitimacy.

Hypothesis 6: Higher output legitimacy will lead to higher network performance.

Figure A1: Expanded proposed model with legitimacy



*Measurement assessment, cross-national applicability and common method bias.*

In this study, output legitimacy in networks is measured by the single item “Do you think that stakeholders in this project will approve of the results?”

The adequacy of the scales is evaluated analyzing convergent and discriminant validity and reliability. Analyzing all items together (concerning network performance and trust constructs) two factors are extracted using exploratory factor analysis with 67.38% of explained variance (49.97% and 17.41%, respectively on the whole sample). Item reliability is evaluated by the size of the loadings of the measures on their corresponding constructs. Convergent validity is assessed by checking that the item loadings are significant and greater than .70 and that the average variance extracted (AVE) of each construct is greater than .50. Results in Table A1 show that in our study convergent validity for both the construct and the indicator level is fulfilled. Reliability was judged by using both composite reliability (CR) and Cronbach’s alpha coefficient. All the scales have a value greater than the threshold value of .70 and the strictest threshold of .8 (Nunnally 1978) for composite reliability. Cronbach’s alpha values are also greater than the .70 threshold.

Table A1: Measurement assessment: Reliability and convergent and validity													
		Whole Sample			The Netherlands			Spain			Taiwan		
		Loadings	Mean	SD	Loadings	Mean	SD	Loadings	Mean	SD	Loadings	Mean	SD
Network Performance													
Indicators	INT	.772	3.76	.80	.795	3.53	.87	.764	3.86	.76	.778	3.95	.68
	INV	.749	3.91	.75	.681	3.79	.86	.721	3.89	.68	.781	4.06	.63
	EFF	.822	3.81	.75	.772	3.75	.83	.875	3.86	.73	.809	3.84	.65
	SUS	.787	3.80	.79	.836	3.78	.87	.793	3.71	.76	.771	3.90	.69
CR		.864			.856			.873			.864		
Cronbach $\alpha$		.791			.779			.806			.792		
AVE		.62			.60			.63			.61		
Level of Trust between actors													
Indicators	REL	.896	3.46	.83	.891	3.57	.85	.898	3.58	.80	.875	3.22	.80
	GDW	.873	3.73	.77	.866	3.83	.79	.857	3.70	.80	.874	3.63	.71
CR		.880			.884			.880			.884		
Cronbach $\alpha$		.730			.739			.730			.739		
AVE		.74			.80			.79			.62		

Discriminant validity is assessed by comparing the AVE of each construct and the shared variance between each pair of constructs (Anderson and Gerbing 1988; Morgan, Kaleka and Gooner 2007). For the fulfillment of discriminant validity the square root value of AVE should be greater than all of the inter-construct correlations. Table A2 provides support for sufficient discriminant validity since the square root of the AVE of each construct is higher than its correlations. Overall, the measurement model results provided support for convergent and discriminant validity of the measures used.

**Table A2. Measurement assessment: Discriminant validity**

		Network Performance	Network management strategies	Trust
<b>Whole Sample</b>	Performance	.786 <sup>(1)</sup>		
	Strategies	.408 <sup>(2)</sup>	n.a.	
	Trust	.457	.370	.862
The Netherlands Subsample	Performance	.774		
	Strategies	.363	n.a.	
	Trust	.510	.390	.896
Spain Subsample	Performance	.794		
	Strategies	.593	n.a.	
	Trust	.565	.344	.889
Taiwan Subsample	Performance	.780		
	Strategies	.310	n.a.	
	Trust	.343	.305	.786
(1) Diagonals show AVE squared root (2) Other values show correlations Note: All correlations are significant at the .01 level (2-tailed).				

The dataset used in this study was collected across three countries. Hence, measurement equivalence is addressed to assess that constructs, via their related scale items, are invariant across the different countries (Malhotra and Sharma 2008). Generalizability theory (G-theory, Cronbach et al. 1972) was used to examine the generalizability of the scales developed to measure latent constructs across groups of interest (i.e. three countries). It is essentially an approach to the estimation of measurement precision in situations where measurements are subject to multiple sources of variation. In our design, we consider five different sources of variation: items in each scale (low variation indicates item redundancy); countries (high variation suggests that countries differ compared to the construct means); subjects within countries (high values indicate that there is variation among subjects within groups); the interaction between countries and items (low variation indicates that the pattern of responses is the same across groups and increases generalizability); and finally, the error and other confounding sources (low variation enhances generalizability).

We implement a mixed ANOVA model for variance decomposition in SPSS to calculate these five sources of variation, and generalizability coefficient (GC hereafter). The results presented in Table A3 indicate that the estimation of all sources of variation follow the above-described patterns, thereby enhancing configurational invariance. Moreover, the two GC values are greater than .85- quite high values according to Rentz (1987) - providing support for the generalizability of the scales across the three countries.

**Table A3. Multi-facet analysis of cross-national equivalence**

Construct	Country %	Items %	Subjects within country %	Country X items %	Error plus other %	GC
Network performance	1.02%	1.46%	51.75%	.84%	44.93%	.852
Level of Trust	2.67%	2.93%	52.76%	.10%	41.54%	.869

Since a limitation of the data is that it has been collected from a single source, it is essential to test for unacceptable levels of CMV regarding the hypothesized relationship involving the output legitimacy variable (the general analysis can be received by authors).

We examined CMV using Lindell and Whitney (2001) marker variable technique. In addition to the items considered in the study we also include perceptions about media management (see endnote vi for more detail about indicators). The absolute correlation between the marker variable and output legitimacy ( $r_M$ ) is the estimate of CMV. In our study,  $r_M = .049$  which corresponds to an  $R^2$  of .24%, indicating a low common source effect.

Table A4 shows that all the correlation coefficients involving output legitimacy variable remained significant after adjusting for CMV. This is, after correcting the correlation coefficient regarding the level of common variance shared between the marker variable and output legitimacy, the adjusted correlation - removing the degree of common variance computed with the unrelated marker variable - remained significant. Moreover, we conducted a test of differences between the adjusted and unadjusted correlations, in order to check for possible statistical differences (Steiger 1980). All coefficients are statistically insignificant, providing further support to the results obtained by applying the marker technique. All in all, we can conclude that the estimations of the parameters related with output legitimacy variable of the hypothesized model, at least according to the test we did, are not biased by CMV.

**Table A4. CMV-adjusted correlation estimates and test of differences between unadjusted and adjusted correlation coefficients**

Constructs Relationships	Pearson Correlation Coefficients <sup>a</sup>		Unadjusted vs adjusted related correlation test	
	Unadjusted estimates	Adjusted Estimates (95% CI)	z-score	p-value
Strategy -Legitimacy	.320*	.285* (.22 – .35)	.673	.50
Trust - Legitimacy	.449*	.421* (.36 – .48)	.608	.54
Legitimacy - Performance	.530*	.506* (.45 – .56)	.57	.57
$r_M$ = The absolute values of the correlation between the marker variable and the output legitimacy variable $p < .001$				

#### *Expanded model results*

Table A5 shows the legitimacy variable having significant Pearson correlation coefficients with all the variables includes in the analysis. The mean comparison test between countries does no reveal significant differences.

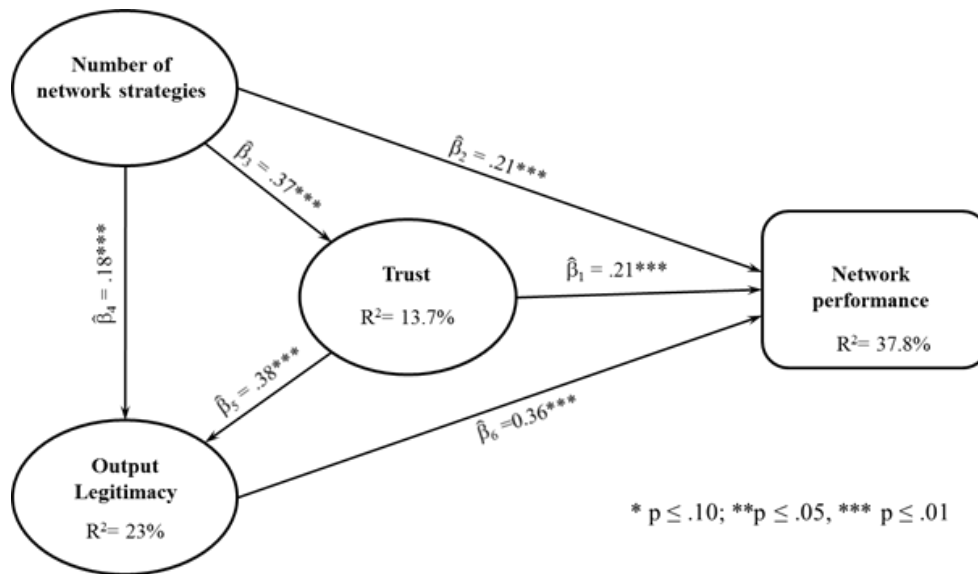
**Table A5. Legitimacy descriptive**

		Correlation coefficient	Mean	SD
Whole Sample	Performance	.530	3.79	.77
	Strategies	.320		
	Trust	.449		
The Netherlands' Subsample	Performance	.466	3.93	.79
	Strategies	.352		
	Trust	.614		
Spain's Subsample	Performance	.581	3.97	.64
	Strategies	.453		
	Trust	.499		
Taiwan's Subsample	Performance	.553	3.90	.74
	Strategies	.197		
	Trust	.224		

Note: All correlations are significant at the .01 level (2-tailed).

Following the same analytical procedure reported in the main document, we applied the PLS estimation approach. A bootstrap procedure was used to obtain the path relationships (standardized regression coefficients) and t-statistics to evaluate the significance of the parameters estimation for our hypothesized extended model shown in Figure A2.

**Figure A2. Results from the expanded model**



Results in Figure A2 (whole sample) and in Table A6 (whole sample and country subsamples) provide support for all our hypotheses. Considering the results for the whole sample, trust has a positive influence on network performance ( $\hat{\beta}_1 = .21$ ,  $p = .00$ ), which is also the case for the number of network management strategies ( $\hat{\beta}_2 = .21$ ,  $p = .00$ ). These strategies also have a strong positive effect on the level of trust ( $\hat{\beta}_3 = .36$ ,  $p = .00$ ). And both network management strategies and trust have a positive effect on output legitimacy, but that effect is much stronger for level of trust ( $\hat{\beta}_5 = .38$ ,  $p = .00$ ) than for network management strategies ( $\hat{\beta}_4 = .18$ ,  $p = .00$ ). We also see a strong positive correlation of output legitimacy with network performance ( $\hat{\beta}_6 = .36$ ,  $p = .00$ ). The extended model explains 37.8% of the variance in the network performance.

**Table A6. Expanded model: Parameter estimation.**

	Whole Sample		The Netherlands		Spain		Taiwan	
	Beta Coeff.	Standard Error	Beta Coeff.	Standard Error	Beta Coeff.	Standard Error	Beta Coeff.	Standard Error
<b>H1:</b> Trust -> Network performance	.215**	.045	.310**	.086	.308**	.068	.188**	.063
<b>H2:</b> Network management strategies -> Network performance	.213**	.041	.193**	.073	.370**	.050	.159**	.067
<b>H3:</b> Network management strategies -> Trust	.371**	.041	.397**	.076	.344**	.071	.304**	.068
<b>H4:</b> Trust -> Legitimacy	.383**	.045	.551**	.064	.389**	.063	.182**	.074
<b>H5:</b> Network management strategies -> Legitimacy	.180**	.039	.162**	.060	.320**	.056	.142*	.073
<b>H6:</b> Legitimacy -> Network performance	.364**	.041	.202**	.087	.261**	.075	.480**	.056
R <sup>2</sup> %	37.8%		32.87%		54.52 %		38%	

\*  $p \leq .05$ , \*\*  $p \leq .01$

The model and our findings suggest that the number of strategies and the trust level among actors may influence network performance in two ways: both directly and indirectly (i.e., when the number of strategies precedes trust level or output legitimacy). In other words, this implies that the relationship between the number of strategies and network performance could be mediated by the level of trust among actors or by output legitimacy. Comparing the proportion of explained variance ( $R^2$ ) of the main effect model (without mediation effect) with the  $R^2$  of the full model (including the mediation effect), the  $R^2$  drops from 37.8% (full model) to 27.5% and to 34.2% when output legitimacy and trust level (respectively), are not considered in the model (see Table A7).

**Table A7. Mediation effect analysis**

Mediator	Indirect effect		Effect Size ( $f^2$ )	$R^2$ %	
	Standardize coefficient	Sobel test statistic		Full model	Without mediator
Level of trust	.14	7.57*	.06	37.8%	34.2%
Output legitimacy	.07	4.09*	.17		27.5%

\*  $p < .05$

Both, direct and indirect effects between the number of strategies and network performance, are statistically significant. This empirical result shows a partial mediation effect of trust and output legitimacy on the relationship between strategies and network performance. Mediation effects with effect sizes of .02 may be regarded as weak, effect sizes from .15 as moderate, and effect sizes above .35 as strong (Chin, Marcolin and Newsted 2003). Thus, output legitimacy has a moderate mediation effect ( $f^2 = .17$ ) and trust level a weak mediation effect ( $f^2 = .06$ ) in this analysis.

### *Conclusions*

Comparing this extended model to the model in our main article, we find some interesting differences. First, output legitimacy has a moderate mediation effect on network performance, thus expanding and improving the conceptual model of our main article (the model also explains more variance than the model in the main article). Second, we find a much stronger effect in Taiwan of output legitimacy than in Spain and The Netherlands.

The latter could again be related to cultural differences already discussed in the main article. Taiwan scores higher on Hofstede's power differences than The Netherlands (and Spain but less so) and much lower on individualism than both other countries and is characterized by strong long term orientation. This makes Taiwan a highly collective Confucian society where hierarchical order is much more important than for instance in The Netherlands. In a more collective society it is clear that output legitimacy is regarded as important, and that trust might be a bit less important to respondents, since there is greater acceptance of hierarchical order that may not require trust to the same degree. This might explain the importance of output legitimacy in Taiwan and the lower correlations for trust in Taiwan. However, these reflections are speculative as cultural variables are not included in our survey. But they do open up an interesting new avenue of research for the future, where characteristics of the network are related to characteristics of the national culture.

## End notes

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<sup>i</sup> In the original article the analysis included output legitimacy as well as the variables we present in the article. The editor believed that this variable created concerns for common method bias, and thus we present these results only in appendix A for interested readers. The authors did a number of tests that some have proposed to “test” for common method bias and concluded, at least based on these tests, that this was not the case.

<sup>ii</sup> For example, Holland, Spain and Taiwan can be regarded as representative of Northern Europe, Southern Europe, and East Asia public administration traditions identified by the cited authors (see Meyer and Hammerschmidt 2010; Berman, Moon and Choi 2011). Some typical differences concern top-down leadership, stakeholder bargaining/consensus-building, techno-legalistic versus strategic-administrative decision-making, and more. Hofstede notes further differences, as well (individualism, uncertainty avoidance, long-term orientation, etc.) discussed also in the conclusion. However, all such differences are relative and highly aggregate that vary in specific settings and program areas.

<sup>iii</sup> In the case of the Netherlands and Spain it was a self-administered web survey. In the case of Taiwan, the survey was administered through interviews conducted by the authors. As is the Taiwan practice, interviewers visited the interviewees in their offices, where interviewees completed survey questions.

<sup>iv</sup> In other research (see Meier and O Toole 2007) more or less objective data are used not collected by surveys. In this case the test scores of students in national tests. Interesting though this is not a measurement of networks but of individual organizations (that is schools). And even this is under debate since they are biased. They do not measure the quality of a school but the quality of pupils which is something very different (schools that have less privileged students for instance may do very well and add much to students knowledge but still score less than other schools which received more privileged students from well-educated parents). So measurement of the network level in objective terms is hardly done and hardly possible since there are so many values and actors at stake with different judgements.

<sup>v</sup> We used this way of constructing the variable because there are some indications that managers and others might overestimate the use of strategies. In this way we made certain that the score was not inflated. We did check whether this lead to different results compared to simply adding the scores but no significant differences were found.