

MODELLING AND ASSESING MULTI-STAKEHOLDER RELATIONSHIPS: THE CASE OF COLLABORATION IN GLOBAL PUBLIC-PRIVATE PARTNERSHIPS

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INTRODUCTION

Public-private partnerships (PPPs) are generally described as alliances of long-term and voluntarily collaborative relationships between autonomous organisations from the public and private sectors. In PPPs, different stakeholders work together in non-hierarchical structures to achieve agreed collective goals in terms of public goods or services (Bäckstrand, 2006; Schäferhoff et al., 2009). It is generally assumed that partnerships are driven by mutual dependence across the public–private divide, where social interactions span across public agencies, legislative offices, interest groups, corporations, and non-profits organisations that have a stake in public decisions within a particular policy area (Park & Rethemeyer, 2012). The advantages of multi-stakeholder collaboration are considerable, including problem solving, knowledge sharing and development of new ideas (Huxham & Vangen, 2005; Provan & Kenis, 2008). Thus, assumption that multi-stakeholder collaboration typically occurs across the boundaries of diverse sectors, this is between actors that represent different groups of stakeholders, is crucial to this aim (Provan & Kenis, 2008; Huxham & Vangen, 2005).

However, this is a complex task. Alternative, network theoretical, research proposes that networks at best reflect, if not augment, existing asymmetries in power concentration and centred relationships between groups of similar nature (Faul, 2016), which limits cross-sectoral collaborative dynamics. In PPPs, every actor represents a sector, which is a social platform where familiarity, shared values and opinions are reinforced and stimulate interaction, discussion and representation within them (Tasselli & Caimo, 2019). In such scenario, participants form partnerships may tend to function in somewhat isolated clusters of strong, frequent and redundant relations with peers that share the same organisational nature (Zappa & Lomi, 2015). Then, collaboration across sector boundaries will tend to be more costly in terms of time and effort to cultivate and maintain cross-boundary relationships between participants of different backgrounds (Tasselli & Caimo, 2019).

So, the question of what facilitates effective cross-boundary collaboration in multi-sector partnerships remains partially answered. Literatures of sociology and organisational behaviour (Contractor et al., 2006) are prolific on theories that generally play out against cross-sector collaboration, but at the same time, literatures on new public management and global governance fields are keen on the potentialities of attain it (Provan & Kenis, 2008; Kapucu et al., 2017).

This research project offers an empirical investigation where the assumption of multi-stakeholder collaboration is tested against a set of theoretical assumptions of individual behaviour in organisations. I argue that to understand the underlying social processes that sustains multi-stakeholder collaboration, it is indispensable to look at the triadic micro-structure configurations of the partnerships because they have the capacity to show actual collaborative interactions between (at least) three individuals who represent different groups of stakeholders, which can be from the public, private or civil society sectors. Within triads the possibilities for an individual to make a decision independently are considerably reduced by the social pressure exerted by the two other members attached. Then, input from different members would be higher in the decision-making process and reflect effective multi-stakeholder collaboration.

Two concepts are central to this exploration. The first is *collaborative advantage*, which captures the synergy argument in that to gain real advantage from collaboration it is necessary the involvement of inputs from the different stakeholder into the process. The second concept,

collaborative inertia, that captures what happens in practice when a limited number of actors tend to dominate the decision-making process, and thus reflecting imbalances of sectoral power and hierarchy (see Huxham & Vangen, 2004). I operationalise these concepts in terms of triadic configurations from social network analysis (SNA) theories (Borgatti et al., 2018; Scott, 2000). First, the *cyclic triads* would facilitate collaborative advantage because of its capacity to reduce the pursuit of individuals' selfishness and facilitate the resolution of interpersonal conflicts (Krackhardt, 1999; Tasselli & Caimo, 2019). Second, the *transitivity triads* for collaborative inertia because it augments the bargaining power of a single actor (Contractor et al., 2006).

I employ exponential random graph models (ERGMs), which is a principled statistical approach to modelling social networks (Lusher et al., 2013). ERGMs are theory driven and allow the disentangling of complex, intersecting, and potentially competing theoretical reasons of why the social ties in the observed network have arisen. This is a crucial step to understand the potential drivers of triadic configuration in PPPs and assess if they occur due to process of homophily, reciprocity, resource dependence, structural balance or a combination of these. ERGMs include the parameters of all these competing theoretical explanations, so the researcher can test these effects against the other and make inferences of the social process that have built the networks of interest. I undertake this research focusing on the main-decision making bodies (i.e., board of directors) of global public-private partnerships because they are suitable templates of multi-stakeholder spaces with representation on a wide range of social sectors.

Whether or not PPPs will prove a model of effective and efficient multi-stakeholder collaboration has yet to be seen. The growing role of these organisations has not been matched with an equivalent amount of systematic study (Schäferhoff et al., 2009; Fowler & Biekart, 2017), and the argument that multisector global partnerships effectively address public challenges through multi-stakeholder collaboration gives the impression that it still is rather a normative idea than a methodologically sound and theoretically grounded empirical fact. Hence, to understand the effectiveness of multi-stakeholder partnering possess an urgent and important challenge for researchers and practitioners since popularity of PPPs as tools for development seems to increase despite their mixed track record (Schäferhoff et al., 2009; Westerwinter, 2017). The research is both timely and important for the consolidation of knowledge and practical lessons to design and shape a more pluralistic and effective governance order for partnerships to solve complex problems in the world.

CONTRASTING DEBATES

Public-private partnerships (PPPs) are hybrid organisations that reflect networked governance by drawing on a diverse number of actors of different constellations from governments, international organisations, non-governmental organisations (NGOs) to industry partners, to name a few. PPPs are formed by non-state actors that co-govern along with state actors for the provision of collective goods and adopt governance functions that have formerly been the sole authority of sovereign nation-states (Bäckstrand, 2006). These entities are gaining prominence as governance engines of "hyper collective action" (Severino & Ray, 2010, p. 2) due to their potential ability to bring together diverse skills and resources from multi-stakeholder groups and generate synergistic relationships (Schäferhoff et al., 2009).

Nowadays, the development agenda of several countries are not limited to governments, but they have been gradually diffused into wider sectors of society through the partnership mode. To say, the responsibility of implementing wider societal commitments to development does not rest exclusively among governments but should also include business and civil society in a larger collaborative endeavour (Bäckstrand, 2006). Issues related to climate change, biodiversity protection, health, corporate social responsibility, and humanitarian aid are some of the problems that these organisations focus on by producing and disseminating knowledge, but also by campaigning, lobbying, funding, and certifying activities that address these issues as well (Abbott, 2012; Westerwinter, 2017). All of which serve as inputs for agenda setting, policy formulation and implementation (Schäferhoff et al., 2009).

PPPs represent soft and non-hierarchical steering, and consequently the logic of arguing and persuasion between members for the rule- and decision-making is key in these arenas (Abbott, 2012). Proponents of multi-sectoral partnering argue that these elements of collaboration promise more result-based governance in decentralised flexible structures. Because of this, partnerships potentially close the implementation gap by connecting different stakeholders in a flexible and decentralised manner. Not surprisingly, PPPs are increasingly promoted by multilateral, bilateral, and nongovernmental development organisations to address pressing governance problems, and thus, impacting the lives of millions of people across the globe (Bäckstrand, 2006).

Partnerships are therefore an expression of the ongoing reconfiguration of authority in world politics and reflect the fact that non-state actors are increasingly engaged in authoritative decision-making that breaks down existing hierarchies of power and cooperation (Faul, 2016; Reinicke, 1999). For Slaughter (2004), cross-sectoral partnering possesses “general virtues of speed, flexibility, inclusiveness, ability to cut across different jurisdictions, and sustained focus on the specific set of problems” (p. 167). Williams (2002) observes that partnerships have the capacity to span boundaries between otherwise separated groups of organisations, and he creates an equivalence between “collaboration, partnership and networking” (p. 103). In the same vein, Peterson (2004) argues that networked governance is based on “relations involving mutuality and interdependence as opposed to hierarchy and independence” (p. 117).

However, this is not always the case. Several PPPs have fell short of expectations (Andonova & Levy 2003; Zammit & Harrod, 2005) and showed limited effectiveness (Börzel & Risse 2005; Bäckstrand, 2012). Thus, contrasting views point out that partnerships can augment existing imbalances of power and collaboration between sectors. This is what Huxham and Vangen (2004) have coined as *collaborative inertia*, because despite stakeholders of being officially “together” in a partnership, collaboration does not come naturally, and it is experienced as a troublesome for some actors.

According to Andonova and Levy (2003), and Westerwinter (2017) few partnerships are true multi-stakeholder endeavours in terms of involving disenfranchised groups. This is, there is both a lack of grassroot and local participation from the developing countries that find burdens in collaborative relations with other sectors. This echoes what Rhodes (2007) argued in that inter-sector alliances are asymmetrical favouring states and market actors above civil society or citizens. This may be an indication that PPPs serve as instruments or powerful organisations to reinvent their mission and reassert their own objectives while enjoying the legitimacy of the multi-stakeholder rhetoric (Andonova and Levy, 2003).

These findings support arguments from sceptics in that PPPs are organisations in which actors with the most advanced capacity are more engaged and embedded rather than those with the largest functional needs (Bäckstrand, 2006). Faul (2016) identifies the possibility that such partnerships can be exclusionary rather than broadening participation, while Benner et al (2003) implies that partnerships can inhibit, rather than facilitate change. According to this set of literature, partnership would mirror rather than transform existing relations of power and not being effective collaborative advantage mechanisms between stakeholders. If this is the case, then the partnering model may not live up to the principles of their formal design (Faul, 2016). But, if this is not the case, what drives then collaborative advantage in PPPs?

PARTNERSHIPS AS NETWORKS

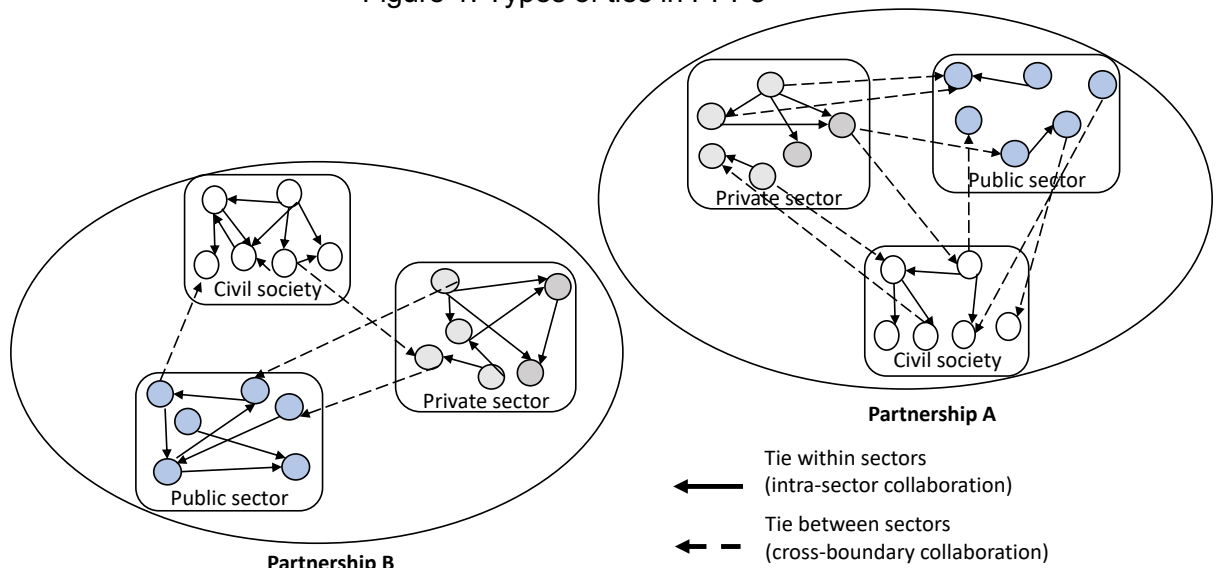
The multi-stakeholder collaboration aimed in PPPs may be the result of “sets of formal institutional and informal linkages between governmental and other actors” (Rhodes, 2006, p. 426). The panoply of diverse actors that intend to collaborate in PPPs weave complex webs and networks relations that build new networked structures (Faul, 2016). It is convenient, then, to analyse and theorise PPPs in terms of the relationships between, and networks of, individuals who belong diverse organisational contexts (Faul, 2016). The nascent research agenda in PPPs is gradually evolving from studying networks in (or between) organisations to dealing with the notion that the network is the organisation (Contractor et al., 2006). In this regard, several authors have argued that organisations are fundamentally relational entities

(Contractor et al., 2006). In particular, Nohria (1992, p. 4) asserted that “all organisations are in important respects social networks and need to be addressed and analysed as such”.

By studying PPP organisations as networks, it is possible to focus our attention on the relationships among entities that make up the partnership, which are called as *actors* or *nodes* (Borgatti et al., 2018). The nodes have characteristics known as *attributes* that are distinguishable among them, and these can be categorial traits such as being male or female, organisational membership (i.e., public, private or social), or continuous attributes, such as age or number of years of experience in an organisation (Scott, 2000). The relationships between nodes can also have characteristics, and in network analysis they are thought as kinds of *ties* or *links* (Borgatti et al., 2018). These ties can be continuously or ordinaly valued. Thus, ties link nodes, which creates chains or paths of nodes whose endpoints are now connected indirectly to the path. This in turn, creates a connected web known as a network (Borgatti et al., 2018).

It is worth to point out that when nodes are collectivities, such as organisations belonging to social sectors, like the case of PPPs, there are two different kinds of possible ties. First there are ties among the nodes that represent the different sectors in the partnership. In other words, these are ties explicitly between the sectors and they resemble cross-boundary collaboration in the form because they are actually forming joint ventures or alliances. Second, there are also ties within sectors. This are ties between actors of the same sector that interact each other. For purposes of better understanding, Figure 1 shows that while Partnership A has a high number of relational ties between individuals of different sectors (i.e., dashed black arrow ties as cross-boundary ties of collaboration), Partnership B, reflects a high level of relational ties between actors within their same sectors (i.e., black arrow ties as intra-sector ties of collaboration) (Tasselli & Caimo, 2019; Zappa & Lomi, 2015).

Figure 1. Types of ties in PPPs



The distinction between these types of ties is important, because they provide better analytical purchase on the effects of networks at different levels of analysis: the dyad, the node and the network as a whole (Borgatti et al., 2018). At the *dyad level* of analysis, it is possible the study of pairwise relations between actors. This is the most fundamental unit of network data collection and is the unit with the greatest frequency in network analyses and it permits analysis of structural equivalence, geodesic distance, and number of shared groups (Scott, 2000). The *node level* of analysis permits exploration of individual actor properties and his/her ties with others, often called *alters*. Here important measures are closeness and betweenness centrality, diversity and brokerage (Borgatti et al., 2018). At the *network level*, variables of analysis will consist of a single characteristic that permeates the network as a

whole. Thus, measures like density, centralisation, level of homophily or transitivity are most often used (Scott, 2000).

The social network analysis can be descriptive and basic (Borgatti et al., 2018). While descriptive analysis consists of calculating a number of standard metrics to describe the structure of a network or capture aspects of node's position, basic research deals with multivariate and correlative analysis to describe the variance in certain variables as functions of others. This research attempts to deliver both types of analysis, and therefore making three moves (as suggested by Contractor et al., 2006): First, the research extends descriptive techniques of SNA to confirmatory and inferential techniques of ERGM; Second, to move from single-level, single theoretical network analysis to multi-theoretical, multi-level analysis by including measures of the dyadic level, the individual or actor level and the global network level; Third to extend purely network explanations to hybrid models that also include attributes of the actors. These steps towards research assures a nuanced analysis of the networks of interest.

HYPOTHESES

A fundamental concept underpinning theorisation of social networks is that of the *dependency* between network ties. It is insufficient to consider actors of networks as unrelated units of analysis and instead it is more realistic to consider them as "actors in social relations" (Abbott, 1997, p. 1152), from which dependency among them comes as a result. Therefore, ties in networks dependent each other. It is in this way that network ties are built and forming important patterns or *configurations*. A network configuration is a possible small subgraph that may represent a local regularity in the social network structure. The importance of a network configuration is that it is a consequential pattern that may represent an underlying social process to infer given the observed network patterns (Lusher et al., 2013).

Without some form of dependence among ties, it is impossible to argue for tendencies for certain patterns of ties to form. So, to postulate configurations as consequential network patterns is to postulate dependence among network ties. In light of this, several theoretical mechanisms of dependence have been offered in a wide range of literatures, and that may explain the creation, maintenance, dissolution, and reconstitution of network ties in organisations.

Monge and Contractor (2001) have identified at least nine families of mechanisms that may explain dynamics in network ties (see Table 1 below). For this research, I focus on theories of (1) self-interest: structural holes or brokerage and transaction costs; (2) mutual interest theories: public goods or inducements to contribute for a cause; (3) cognitive consistency theories: balance practices to avoid disparities in groups; (4) exchange and dependence theories: social exchange that explains quality of what is given and received, resource dependence that explains the inequality of what is given and received; and (5) homophily theories: social identity that explains the interaction of people with similar attributes.

The following hypotheses are designed to be tested in terms of the probabilities of graph realisations with specific structural tendencies or configurations of interest. ERGMs allow the testing of these hypotheses simultaneously by drawing estimates from multiple simulations in a stochastic process of the multiple simulations of graphs than can be recreated considering the same number of nodes of the observed network. This process permits inferences about whether in the observed network, there are significantly more (or less) configurations of our interest. I further explain this process in the following section of Methodology.

Table 1. Social theories and theoretical mechanisms

Theories	Theoretical mechanisms
<i>Self-interest theories</i>	<i>Individual value maximization</i>
Social capital	Investments in opportunities
Structural holes	Control of information flow (brokerage)
Transaction costs	Cost minimization
<i>Mutual self-interest and collective action theories</i>	<i>Joint value maximization</i>
Public good	Inducements to contribute
Critical mass	Number of people with resources and interests
<i>Cognitive theories</i>	<i>Cognitive mechanisms leading to</i>
Semantic/knowledge networks	Shared interpretations/expertise
Cognitive social structures	Similarity in perceptual structures
<i>Cognitive consistency theories</i>	<i>Choices based on consistency</i>
Balance	Drive to avoid imbalance and restore balance
Cognitive dissonance	Drive to reduce dissonance
<i>Contagion theories</i>	<i>Exposure to contact leading to</i>
Social information processing	Social influence
Social learning	Imitation, modelling
Institutional	Mimetic behaviour
Structural theory of action	Similar positions in structure and roles
<i>Exchange and dependence theories</i>	<i>Exchange of valued resources</i>
Social exchange	Equality of exchange
Resource dependence	Inequality of exchange
Network exchange	Complex calculi for balance
<i>Homophily theories</i>	<i>Choices based on similarity</i>
Social comparison	Choose comparable others
Social identity	Choose based on own group identity
<i>Proximity theories</i>	<i>Choices based on proximity</i>
Physical proximity	Influence of distance
Electronic proximity	Influence of accessibility
<i>Network evolution and coevolution theories</i>	<i>Variation, selection, retention</i>
Organizational ecology	Competition for scarce resources
Complex adaptive systems	Network density and complexity

Actor level

At the actor level refers to various actor-level network properties that influence the probability ties will be present or absent in the network. There are various endogenous variables that at the actor level can be explored such networks metrics like centrality, prestige or structural autonomy in the network. These are actor-level properties because they characterise the position of an individual actor in the network. For instance, the *theory of structural holes* (Burt, 2004) suggests that actors seek to enhance their structural autonomy by forging ties with two or more unconnected others, thus creating indirect ties between individuals with whom they are linked (Borgatti et al., 2018).

This hypothesis would be supported if there were greater probabilities for network realisations in which actors had a high degree of structural autonomy. In other words, this hypothesis would be supported if the probability of ties being present or absent in the network reflected actors' tendencies to exhibit structural autonomy.

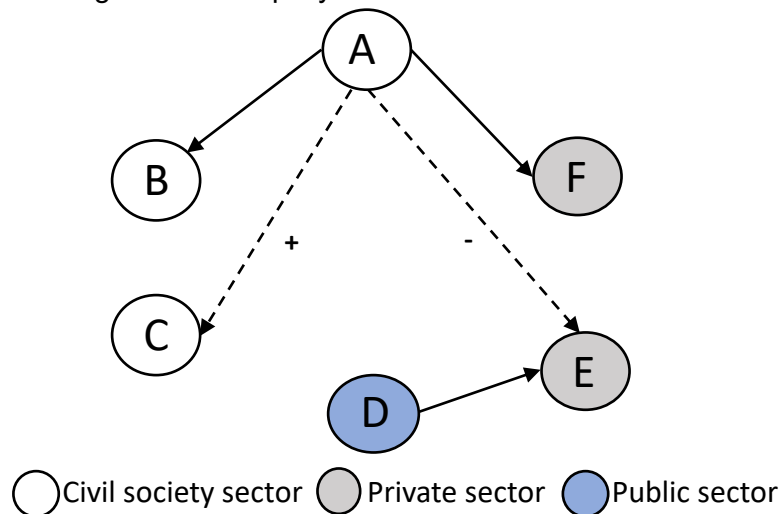
In Addition, at the actor-level, nodes' properties are critical for any analysis of social networks. Actor-level properties like gender, membership in an organisation, sector, and years

of experience in multi-stakeholder alliances have been used in most studies. Theories of *homophily* (Ibarra, 1992; McPherson et al., 2001) suggest that individuals have ties to others with whom they share similar attributes. Then, nodes will tend to be more linked with peers that belong to the same sector (e.g., public, private or social), an attribute that this research highlights as primarily. This assumption is further supported by theories of transaction costs (Williamson, 1985), because collaboration across sector boundaries will tend to be more costly in terms of time and effort for actors to cultivate relationships between participants of different backgrounds (Tasselli & Caimo, 2019). Then, actors will be more likely to report ties to other individuals with their own organisational culture because that also facilitates understanding and effectiveness of communication.

The hypothesis based on homophily would be supported if there were greater probabilities for graph realisations in which actors with shared attributes were more likely to have ties with one another. This is, hypotheses would be supported if the probabilities of ties being present or absent in the network reflect actors' tendencies to choose other with similar attributes. This configuration would help to understand the extent to which actors with similar sector affiliation are more likely to have collaborative ties with one another than with actors from other sectors. If this is the case (*ceteris paribus*), PPPs may not live up to the principles of cross-sectoral collaboration through which they were originally design.

Figure 2 illustrates the two effects set out above. The theory of homophily, would posit a greater tendency for a tie from actor A to actor C, since they both share a common attribute (i.e., both are representatives of civil society organisations), and a lower tendency for a tie from actor A to actor E, because they do not share a common attribute (actor E representing the private sector). Similarly, actors can abide by the theory of structural holes, where actor A is more likely (shown with a positive sign) to have a tie with actor C, because this would represent a non-redundant tie since there is no tie between actor B and actor C despite of sharing the same sector. Because we are talking about probabilities there may well be some occasions where a tie exists from A to E. However, the probability of these ties will diminish if there are ties from actor A to actor B and not from A to C.

Figure 2. Homophily and structural hole theories effects



Dyadic level

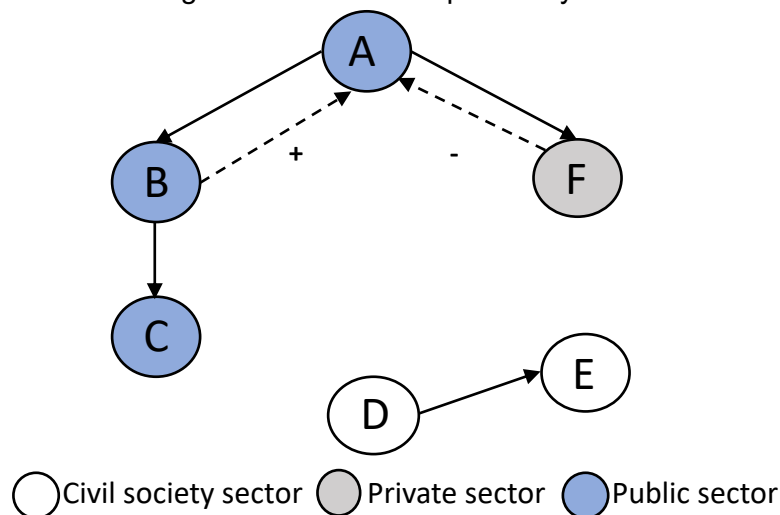
The dyadic level refers to various dyadic counts that influence the probability ties will be present or absent in the network. When it comes to variables at the dyadic-level, the basic property that deemed necessary of consideration is reciprocation. A robust literature on *social exchange* (Blau, 1964), *network exchange* (Wilier & Skvoretz, 1997), and *resource dependence* (Pfeffer & Slancik, 1978) suggests that actors, either individuals or organisations forge ties using a calculus of exchange of material or information of resources. Dependencies

between actors then stem from their need of resources, communication or friendship. However, lack of reciprocation is often considered as a sign of status or privilege for those network members who choose not to reciprocate (Hafner-Burton & Montgomery, 2006).

The argument proposed here is that there is a greater tendency for exchange ties to occur among pairs of actors who share similar attributes. Thus, the hypothesis based on this reciprocation would be supported if there were greater probabilities for graph realisations in which actors with shared attributes were more likely to have reciprocal ties with one another. In other words, this hypothesis would be supported if the probability of ties being present or absent in the network reflect actors' tendencies to reciprocate ties with other actors sharing similar attributes. Failing to reject the null, then it would mean that actors involved in PPPs are not more likely to be engaged in mutual interactions with individuals in their own type of sector compared to individuals from the other type of organization. This

Figure 3 shows how theories of resource dependence would posit a greater tendency for mutual ties between, for instance, public sector actors A and B, and a lower tendency for mutuality between government actor A and private sector F.

Figure 3. Resource dependency effect



Triadic level

The triadic level refers to various triadic network configurations that influence the probability that ties will be present or absent in the network. These triadic-level properties include *transitivity* and *cyclical* (Block, 2015). A triad is transitive if when node A has a tie to node B and node B has a tie to a third node C, node A has a tie to node C. Tendencies for transitivity can be interpreted in multiple ways, depending on the substance of the relationship being study. Generally, the *theory of balance* would explain this effect as nodes connected each other will tend to close the triad with a third node (Heider, 1958; Granovetter, 1973). For this study, however, this relationship would imply the exercise of authority or collaborative inertia as explained in the Introduction. Transitivity reflects a hierarchical tendency in that “one’s boss’s boss is also one’s boss” (Contractor et al., 2006, p. 2006). Therefore, hierarchies dominate the configuration precluding equal connectivity between nodes, since at least one of them does not receive ties.

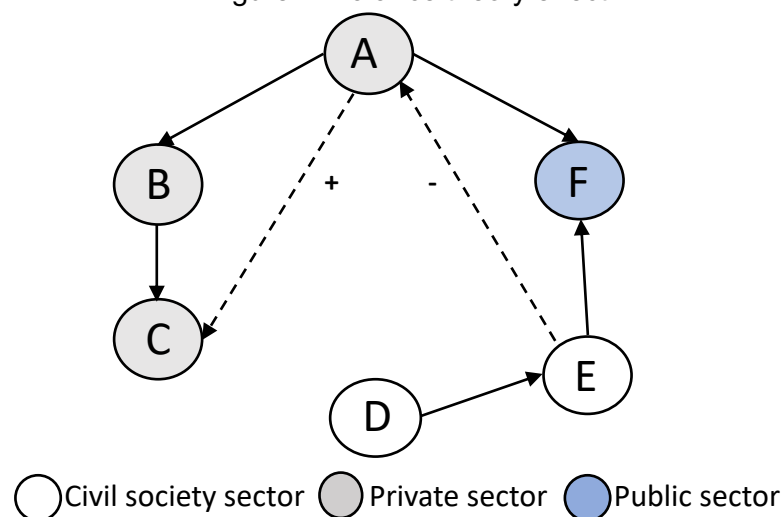
On the other hand, *cyclical* in triads occurs when there is a tie from node A to node B, a tie from node B to node C, and a tie from node C to node A, completing the cycle (Block, 2015). For this research, the theory of *generalised exchange* (Block, 2015; Bearman, 1997) suggests that cyclical provides the possibility of common and equal exchange between nodes of the triad. This would mean, in other words, a lack of hierarchies and equal provision of input in the triads.

For actors sharing similar attributes, there will be a greater tendency for transitive and cyclical ties. Hypotheses based on this, would be supported if there were greater probabilities for graph realisations in which nodes with shared attributes were more likely to have a high degree of transitivity and cyclicity ties with one another.

Therefore, Figure 4 indicates that theories of balance would posit a greater tendency for a tie from actor A to actor C, since it completes a transitive triad between, say private sector nodes. However, there would be a lower tendency for a tie from actor E to actor A, since it completes a cyclical triad that includes three different nodes: government, industry and civil society sector actors.

Substantively, if found in a network that actors are embedded in both cyclical and transitive relations, it would mean that that PPPs' nodes present a tendency to collaborate collectively in triads rather than to rely on unitary chain-of command or independent dyadic links. On the other hand, a not greater-than-chance probability for actors in one type of sector to forge mutual ties or transitive ties involving other actors from the same sector type would suggest that actors have a tendency not to "ganging up" in mutual dyads and hierarchical triads with their respective peers. Given the goal of PPPs to collaborate across these boundaries, this may be interpreted as a promising sign.

Figure 4. Balance theory effect



Global level

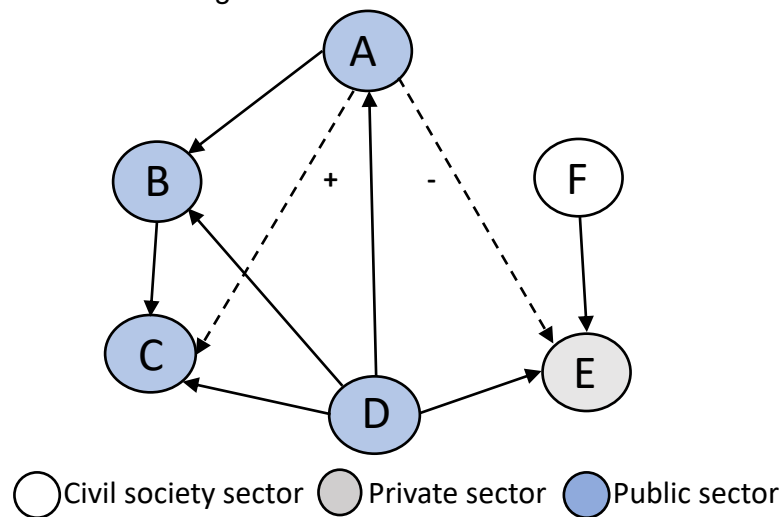
The global level refers to overall network measures that influence the probability ties that will be present or absent in the network. These global properties include the network's degree of centralisation. A network has a high degree of centralisation (i.e., efficiency of the network as an exchange system) when some actors in the network have much higher degree of centrality than other actors (i.e., some actors are more influential than others). Theories of *collective action* (Coleman, 1986) suggest that actors in a network are more likely to obtain a collective good if the network is centralised because it will show an effective medium for the interchange of goods (Marwell et al., 1988).

This hypothesis would be supported if there were greater probabilities for graph realisation in which actors with shared attributes were more likely to have higher levels of subgroup network centralisation. This is, the hypothesis would be supported if the probability of ties being present or absent in the network reflect actors' tendencies to forge more centralised subgroup networks with other actors that share similar attributes.

In Figure 5, theories of collective action would suggest a greater tendency for a tie from actor A to fellow government actor C, since it would enhance the centralisation within government actors, but a lower tendency for a tie from actor A to industry actor E, since it would enhance centralisation in a tripartite sector subgroup. If the former scenario occurs as

significant, then estimates would indicate then, that there is a lower than-chance probability for actors to forge ties that would enhance the centralisation of their sectoral subgroups involving other actors with similar organisational background. Given the goals of PPPs, to mobilise a collective agreement across different constituencies, this finding would seem positive.

Figure 5. Collective action effects



METHODOLOGY

I employ Exponential Random Graph Models (ERGMs) to test the hypothesis listed in Table 2. ERGMs are primarily designed to model a network as an accumulation of social micro-configurations that are thought to represent social processes. These models can be used to characterised networks as outcomes of various micro-forces working together to produce the observed network. Here, the observed network is assumed to be only one network realisation among many theoretical possibilities keeping the same number of nodes. Theoretically, there are many possible graphs that could arise on the ties among nodes. All of these are possible network realisations and this number can be quite large. The observed network is only one of these possible network realisations, bearing in mind the same number of nodes.

Table 2. Hypotheses

Independent variable	Hypotheses: Graph realisations where...
Actor attribute (individual level)	H1:... actors in the network who belong to the same type of sector (i.e., public or private sector) are more likely to have ties with one another
Actor attribute (dyad level)	H2:... actors in the network who belong to the same type of sector (i.e., public or private sector) are more likely to have mutual (or reciprocated) communication ties
Actor attribute (triadic level)	H3:... actors in the network who belong to the same type of sector (i.e., public or private sector) are more likely to be embedded in transitive or cyclical ties with one another
Actor attribute (global level)	H4:... actors in the network who belong to the same type of sector (i.e., public or private sector) are more likely to have higher levels of subgroup (sectoral) centralisation than the overall network's centralisation

Therefore, the probability of the observed network relates to the probability distribution across the sample space (number of graphs simulated in the model). Hypotheses about network properties in effect pick out different types of networks as more probable within the sample space (Contractor et al., 2006). The question of interest in statistical modelling of social

networks is whether the observed graph realisation exhibits certain hypothesised structural tendencies. The extent to which these tendencies are exhibited is captured by parameters, which are estimated by quantifying the effects of the hypothesised structural property on the probability of ties being present or absent in the network.

The result of ERGMs for a given network and a given set of configurations of interest will be a set of parameters values, one for each of the chosen configurations, together with a standard error (Lusher et al., 2013). These parameters describe a distribution of graphs with the hypothesised properties, in which the observed network is the most typical representative (Contractor et al., 2006). Thus, large positive parameters show that the corresponding configuration occurred more frequently than we would expect given the other configurations in the model. On the other hand, large negative parameters would show that these configurations occurred less frequently than expected given the other configurations (Borgatti et al., 2018). Several scholars assert that that parameters estimates that are more than twice as large as their standard error can be considered as significant (Borgatti et al., 2018; Lusher et al., 2013).

The parameters can be estimated by using Markov Chain Monte Carlo (MCMC) maximum likelihood estimation (Lusher et al., 2013). The software to be employed for this analysis is PNet (Lusher et al., 2013).

UNITS OF ANALYSIS

For the selection of units of analysis for this research, I focused on partnerships in which their main decision-making bodies comprise actors whose sectoral backgrounds belong to the for-profit, civil society organisations and governments. I argue, that this is the key characteristic that makes PPPs so unique, because it is through the dynamics of interaction and collaboration between people from different sector backgrounds that multi-stakeholder collaboration is thought to thrive.

I ensembled a dataset as my sampling frame by relying on previous data collection efforts that to the best of my knowledge represent the most comprehensive sources of information about global partnering nowadays. These sources entail the Global Solution Network (GSN, 2017) database, the United Nations Environment Programme (UNEP, 2017), the UN World Summit on Sustainable Development partnership database (WSSD, 2018), the Yearbook of International Organizations (YIO, 2017), and the Transnational Public-Private Governance Initiatives in World Politics dataset (Westerwinter, 2017). This led to a compilation of more than 600 global PPPs. From these, I have selected those PPPs that met all of the following criteria:

1. The PPP has at least three types stakeholder groups that represent traditional multi-sector organisations (i.e., industry, civil society, government) and that participate in the primary decision-making body of the partnership (i.e., board of directors or general assembly);
2. The partnership has a voluntary nature (i.e., optional for companies and other stakeholders to join although once a member, compliance with certain standards may be mandatory).
3. The partnership's standards or operations are implemented in more than one country (i.e., international/global partnerships).
4. The partnership has an official and current active website.
5. The partnership has published names and posts of members belonging to the main-decision making bodies.

In total, I have included 44 PPPs in the sample for this research. Most of these partnerships are legally registered as non-profit organisations in a wide range of countries, while some others are hosted by external organisations. The sample ended up with a considerable reduced number of units of analysis, since most of the partnerships reviewed included multi-stakeholder dynamics in the lower echelons of the partnerships which means that actors

belonging to different sectors have no voting rights or are not directly related with the management of the partnership. Table 3 contains the list of names of these entities.

Table 3. Sample of PPPs

1	Alliance for Responsible Mining	23	Green-E
2	Alliance for Water Stewardship	24	Hydropower Sustainability Assessment Protocol
3	Better Cotton Initiative	25	ICTI Care Process
4	Bonsucro	26	Initiative for Responsible Mining Assurance
5	Construction Sector Transparency Initiative	27	International Code of Conduct for Private Security Providers
6	Diamond Development Initiative	28	International Seafood Sustainability Foundation
7	Equitable Food Initiative	29	International Sustainability and Carbon Certification
8	Equitable Origin	30	Marine Aquarium Council
9	Ethical Trading Initiative	31	Marine Stewardship Council
10	Extractive Industries Transparency Initiative (EITI)	32	Program for Endorsement of Forest Certification (PEFC)
11	Fair Labor Association	33	Rainforest Alliance
12	Fair Stone	34	Roundtable on Responsible Soy
13	Fair Wear Foundation	35	Roundtable on Sustainable Biomaterials
14	Fairtrade Labelling Organisation	36	Roundtable on Sustainable Palm Oil
15	Florverde Sustainable Flowers	37	Social Accountability International
16	Food Alliance	38	Sustainable Forestry Initiative
17	Forest Stewardship Council	39	UN Global Compact
18	Global Coffee Platform	40	Voluntary Principles on Security and Human Rights
19	Global Network Initiative	41	Worldwide Responsible Accredited Production (WRAP)
20	Global Reporting Initiative	42	HCV Resource Network
21	Global Sustainable Tourism Council	43	RedE America
22	Goodweave	44	Global Initiative For Fiscal Transparency (GIFT)

CONCLUSION

The current stage of this research project is data collection of those selected units of analysis in the sample. Online surveys are the instruments for data collection. The relational data of multi-stakeholder actors of the board of directors of PPPs will allow to test hypotheses of Table 2. This will be only the identification stage of those PPPs that actually undertake effective multi-stakeholder collaboration between their members of board of directors. A second stage would be to analyse management strategies and specific characteristics in terms of structure and internal governance that drives those collaborative dynamics across sector boundaries. This will bring more precise insights on ways of how to design and manage more effective PPPs. Due to space limitations for this paper, this section has been omitted. However, during the presentation of the 7th International Conference on Sustainable Development, this section will be explained in depth.

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