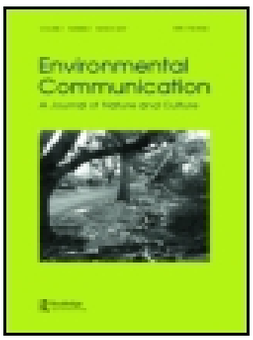

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ORIGINAL ARTICLE

Corporate environmental responsibility and global online cross-sector alliance network: a cross-national study

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ABSTRACT

With the rise of global environmental issues and the emerging trend of corporate social responsibility (CSR) and corporation–non-governmental organization (NGO) alliances, organizations are developing collaborative alliances across sectors and nations to address environment problems. An international perspective is needed to explain the global structure of cross-sector alliance networks and the divergence or similarity of CSR communication across nations. This exploratory study draws insights from the national business systems (NBS) approach and applies social network analysis to examine the cross-sector alliance network among Global 500 Fortune corporations and 441 environmental international NGOs. Findings suggest that (1) an NBS approach to CSR can explain the network structural features of a cross-sector alliance network; (2) political context and national education level strongly predict green partnerships; and (3) regional differences are apparent in the global network, with Asian corporations lagging behind in cross-sector alliance building.

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Environment cross-sector alliance; environmental corporate social responsibility; national business systems

Introduction

Multinational corporations are influential actors in the era of globalization. Of the 100 largest economies in the world, 51 are corporations, while only 49 are nations (McIntosh, 2007). With great resources and power come great expectations for social responsibility. Corporations are increasingly expected to engage in ethical labor practices, give back to society, and operate in socially and environmentally responsible ways. One of the major areas that corporations are expected to contribute is environmental protection and sustainable development (United Nations Environment Programme, 2012).

Major environmental issues such as climate change, deforestation, the extinction of wildlife, and air, land, and water pollution pose serious challenges to sustainable economic development, biological diversity, public health, and eventually could threaten the future of human society (Kim & Nam, 2012). The unprecedented scale and scope of environmental issues makes it impossible for any sector, be that governments, corporations, or non-governmental and nonprofit organizations (NGOs), to single-handedly provide effective solutions.

Hence, cross-sector alliances are more important than ever in addressing the complex environmental issues that spill over sectoral and national boundaries. In the United States, for example, corporations provided over $15 billion donations to NGOs in 2012 and environmental NGOs were among the top four nonprofit sectors that experienced the fastest rate of growth (Giving USA, 2012). The alliances between corporations and NGOs have extended beyond the financial area. For instance, corporations, such as IBM, General Motors, Johnson & Johnson, and Starbucks,

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have encouraged employees' participation in environmental programs. Some corporations have also developed marketing affiliations with NGOs that promote their environmental engagement (Rondinelli & London, 2003). Nevertheless, it is necessary to acknowledge that a considerable variance exists in corporate behaviors. Some companies such as BP, Chevron, Exxon, Shell, and Monsanto often undertake activities that raise concerns regarding their impact on human health or the environment (Livesey, 2001). But even for these companies, expectations for CSR often bring considerable pressure and challenges that occasionally result in organizational crises.

In the light of the growing trend of corporations–NGOs alliances, we argue that cross-sector alliances among multinational corporations and international non-governmental organizations (INGOs) are a form of international corporate social responsibility (CSR) with considerable global significance. Specifically, for environmental issues, the breadth, depth, and forms of such collaboration hold critical implications for effective solutions to environmental protection. Meanwhile, the practice of CSR as a marketing tool and instrument to gain legitimacy has been primarily investigated in the Western context, with little known about CSR practices at the global level (McIntosh, 2007). Additionally, previous studies have examined how different network positions within a cross-sector alliance network enable or constrain organizations' access to resources within different countries (Faulkner & de Rond, 2000). However, little is known about the global alliance network among multinational corporations and environmental INGOs, nor what factors are likely to shape the structure of this network. Nonetheless, knowledge about the global network structure of cross-sectoral alliances is essential for the building of a theoretical framework that account for emerging international practices. Furthermore, a cross-national research design offers a macro-perspective that is rarely available in case studies or single-country-based CSR research.

This paper adopts the national business systems (NBS) approach to study CSR communication. The NBS assumes that the management decisions of adopting CSR is influenced by different countries' socioeconomic and political environments. The NBS highlights the relevance of national context in CSR research, offers a comparative framework to examine international CSR, and thus is especially relevant to the current cross-national research context. In fact, empirical studies have shown that the NBS approach can explain regional differences in CSR performance (Brønn, 2012; Chapple & Moon, 2005). We argue that since alliance building is an important form of CSR communication (Shumate & O'Connor, 2010a, 2010b), the NBS approach can be applied to explain network features of corporate–NGO alliances at the global level.

This study makes several unique contributions. Theoretically, the study integrates the NBS framework with the cross-sector alliance literature, and therefore advances theoretical development on global CSR research. Our findings support that the NBS can explain certain aspects of cross-sector alliance building. Methodologically, this study reliably combines data-mining, human coding, social network analysis (SNA), as well as an inferential network statistical modeling, bipartite exponential random graph model (ERGM), in data collection and analysis. SNA refers to a school of methods that investigate the relationships among a group of actors through the use of networks and graphs (Scott, 2012). Bipartite ERGM represents a recent extension in social network modeling (for details, see Wang, Pattison, & Robins, 2013). The value of SNA to CSR studies have been recognized in the literature (e.g., Chen, 2009; Fieseler & Fleck, 2013; Fieseler, Fleck, & Meckel, 2010), and this study makes a rigorous and valuable effort to demonstrate how SNA can provide a fertile ground for future CSR research. Overall, the current study extends the theoretical and methodological boundaries of global CSR research and provokes new research directions and questions.

Literature review

In this section, we first introduce the concept of CSR and review recent studies on global CSR trends, with a focus on cross-sector alliances. Further, we discuss the NBS approach to CSR as a valuable theoretical approach to study global CSR and propose a number of hypotheses according to this framework.

Global CSR: universally standardized or locally unique?

CSR can be understood as a set of actions aiming at furthering social good, beyond the explicit pecuniary interests of corporations (Carroll, 1999). The idea of CSR first appeared in the second half of the twentieth century. Two streams of thought have contributed to the early development of CSR (Garriga & Melé, 2004). The business-centered school believed that corporations were only instruments for wealth creation (Friedman, 1970). The other school maintained that corporations had wider duties towards the society (Carroll, 1999; Garriga & Melé, 2004). In the twenty-first century, the trend of globalization, the emergence of global issues, and the increasingly complex and interdependent business landscape have heightened the awareness of corporations' responsibility towards the greater society.

It is necessary to acknowledge that, despite its popularity, the concept of CSR is not without criticism. For instance, some have argued that the concept of CSR is vaguely defined and there is no theoretical framework that clearly explains why businesses engage in CSR or outlines the effects of CSR on business (McWilliams & Siegel, 2001). Further, Hamann and Acutt (2003) argue that business often engage in CSR as a form of cosmetic changes to avoid bigger changes and to resist social monitoring, intervention, and regulation. Khan and Lund-Thomsen (2011) contend that in the era of globalization, CSR can be a new form of Western imperialism that further trivializes culture and social norms in the developing world. Recognizing these issues, the current study focuses on one form of CSR practices, environmental cross-sector alliances, and adopts a global perspective to expand the research horizon.

Indeed, the concept of CSR has spread across the world (Chapple & Moon, 2005). CSR is increasingly characterized by a transnational characteristic because multinational corporations, INGOs, and international governmental organizations (IGOs) are often the primary agents in global CSR movements to address social and environmental issues (Doh & Guay, 2006). In the process of dissemination, global standards such as the UN Global Compact, the Global Reporting Initiative, and ISO standards were proposed to offer global guidelines and standardized practices. So far, CSR has been endorsed and valued by many governments and key global institutions such as the World Bank and the United Nations (Gjølberg, 2009).

Corporate social responsibility and cross-sector alliances

Among CSR activities, cross-sector alliances, defined as alliances established between organizations of different sectors (i.e., between corporations and INGOs/IGOs) (Rondinelli & London, 2003), often go beyond the short-term charity donations but generate sustained opportunities to bring together social actors and create social capital (Austin, 2000). Global cross-sector alliance networks reflect the international cooperative aspect of CSR, and a study of these networks could unfold important patterns emerging from global CSR practices. In this study, cross-sector alliance networks among multinational corporations and environmental INGOs are conceptualized as a form of global public good that channels resources and expertise to solve pressing social issues, such as environmental protection, sustainable development, or health disparities and crises. To explore how global CSR and cross-sector alliance building practices may manifest differently in local context, this study is grounded in the NBS approach to CSR (Matten & Moon, 2008). NBS explores the interaction between the universal characteristics of CSR and the influence of regional and national contexts on local CSR practices. This approach is discussed in detail below.

An NBS approach to CSR

Many have observed that the operation of CSR practices differ considerably across various social, economic, cultural, legal, and political contexts (Brønn, 2012; Gjølberg, 2009; Matten & Moon, 2008). The NBS approach to CSR is thus developed to theoretically explain the local divergence of CSR in a globalized context (Matten & Moon, 2008). The NBS approach to CSR assumes that

the motives of managers and expectations of shareholders govern corporate behaviors. Such motives and expectations are shaped by national contexts. Therefore, the divergence of local CSR practices may be explained by different characteristics of a country's national institutional context. Guided by the NBS approach, Matten and Moon (2008) found that corporations from liberal economies with small governments were more likely to be explicit in their communication of CSR, because liberal market economies left a larger share of corporate responsibility issues to the discretion of the companies. In contrast, corporations from coordinated economies tended to shoulder fewer social and environmental responsibilities, because they were mainly expected to obey the regulations of governments and other social institutions.

Four aspects of national institutions can be especially influential: the political system, the financial system, the education and labor system, and the cultural system. Specifically, in terms of political system, the explanation for the relationship between state intervention and corporate CSR behaviors is rooted in the government failure theory (Selsky & Parker, 2005). This theory maintains that the inefficiency of government interventions leads to an insufficient provision of public goods, and therefore creates needs for other social actors, such as corporations or NGOs, to step in and assume social responsibility. The theory predicts a negative relationship between the level of government intervention and corporations' engagement in CSR activities. Indeed, Doh and Guay's (2006) comparative study found that the differences of institutional structures and political legacies in the United States and Europe have led to distinct approaches to CSR issues by both corporations and NGOs in these regions. The current study follows the NBS logic and hypothesizes a negative relationship between government intervention—indicated by the level of control the government has over a country's political and economic system—and the level of cross-sector alliances, which is assessed by the total number of cross-sector alliance relationships that each corporation has. We state this hypothesis formally below:

H_1: The level of government intervention will negatively affect the cross-sector alliance level.

The second NBS factor that may influence cross-sector alliance building is the country's financial system (Matten & Moon, 2008). In highly developed markets such as the United States, the stock market is often the central financial source for companies to obtain capital. Because shareholding is relatively dispersed in such markets, corporations are more pressured to live up to social norms and public expectations in order to appeal to a large spectrum of shareholders. Therefore, for corporations originated from such market, they are motivated to build active alliances with NGOs in order to demonstrate accountability and social responsibilities to existing and prospective investors. In other words, in countries with highly developed financial systems (the level of financial system indicated by the level of national wealth), corporations are more likely to engage in building cross-sector alliances with NGOs to appeal to the public and gain social legitimacy. We thus hypothesize:

H_2: The development level of financial system will positively affect the cross-sector alliance level.

The NBS further theorizes that education and labor systems may also affect corporate CSR and cross-sector alliance building (Matten & Moon, 2008). It is important to note that internationally, countries differ significantly at the postsecondary school enrollment rate, which is an important indicator of a country's overall educational attainment (Barro & Lee, 2001). A highly educated labor force is more likely to actively pursue employee rights and press corporations to adopt higher standards of social responsibility. Furthermore, an educated labor force tends to be better equipped with bargaining power, which may further empower the employees when it comes to issue advocacy or negotiation with the corporations. For instance, McCown's (2007) case study found that when faced with perceived communication gaps, university employees were able to implement effective activist strategies that eventually brought in organization-wide structural changes. Specific to the context of environmental issues, research also has shown that education level affects

individuals' environmental awareness and attitudes. Taken together, we propose the following hypothesis:

H_3: The level of education and labor systems will positively affect the cross-sector alliance level.

Finally, the philanthropy culture differs from country to country (Matten & Moon, 2008). Research has found that societal-level values and norms collectively held by members of a society may influence specific values and beliefs such as CSR (Javidan, Dorfman, Sully de Luque, & House, 2006). In societies where "giving back to society" is highly regarded, corporations that fail to live up to this cultural norm may face social condemnation (Matten & Moon, 2008). Since cross-sector alliance has increasingly become a popular way for corporations to engage members of local communities and give back to society, it is reasonable to expect that the philanthropy culture, measured by the average amount of donation of a country, may positively associate with the level of cross-sector alliances.

H4: Philanthropy culture will positively affects the cross-sector alliance level.

At the regional level, studies have found that corporations originated from similar geographic regions demonstrated comparable patterns of CSR communication. For instance, Kim, Nam, and Kang (2010) identified regional differences regarding the emphasis on environmental issues. Specifically, "climate change" is found to be a key concern in Europe and North America, while the concern for "resources/waste management" is more pronounced in Asia. Specifically, issues like climate change are more likely to be salient for European and North American organizations, partly influenced by recent international agreements such as the Kyoto Protocol. Meanwhile, the rapid economic growth in Asia draws an increased concern over resources conservation and waste management. In short, it is likely that corporations from different regions face distinctive environmental challenges, and this may affect their cross-sector alliance building. We therefore propose the last hypothesis:

H_5: Regions-of-origin of corporations are likely to affect the cross-sector alliance level.

To sum up, the NBS approach to CSR offers a valuable theoretical lens to understand the global CSR penetration within local contexts. To date, the NBS approach has mostly been applied in CSR communication and reporting (Chapple & Moon, 2005). The current study bridges a gap in the literature and applies this approach to study corporations and environmental NGOs' global alliance. The following sections present the method, results, and discussion.

Method

Sample

This research utilized a sample of 500 corporations from the 2013 Global Fortune 500 list. In addition, to obtain a comprehensive sample of environmental INGOs, this project first obtained a list of all identifiable environment INGOs in the world from *The Yearbook of International Organizations,* one of the most comprehensive records of international organizations (Smith & Wiest, 2005). The final list of environmental INGOs was identified through a combination of keywords search at UIA's (Union of International Associations) online database and manual verification. Specifically, the UIA database categorized organizations based on organizations' missions. Our search retained organizations that are categorized as relevant to "environment(al)," "climate," "water," "ocean," "earth," "planet," "wildlife," "forest(ry)," and "green." Two researchers further inspected each organization and only included INGOs that met the following criteria: (1) had members in more than one country; (2) mainly focused on environmental protection as suggested by the organization's mission statement; and (3) was a nonprofit and non-governmental organization. The final list included a total of 441 environmental INGOs.

Data collection

This study utilized online archive information stored on each organization's website, and the unit of analysis was the hyperlink embedded in organization's official sites. Social scientists have extensively examined hyperlinks as indicators of social relationships (Park, 2003). Park and Thelwall (2003), for instance, maintained that hyperlinks often are "designed, sustained, or modified by Web sites creators to reflect their communicative choices and agendas" (p. 6). Our data collection thus did not include links that incorporate social media accounts or corporate weblogs for the following reasons: first, CSR communication on organizations' official website has been viewed as substantially different from other digital platforms. Specifically, the official websites are relatively stable portals through which public can access comprehensive organizational information at time and location. Organizations can strategically *signify* alliance to the third-party stakeholders on websites (Shumate & O'Connor, 2010a), whereas platforms like weblogs and social media are more often used to directly engage stakeholders through interactive dialogic processes (Fieseler & Fleck, 2013). Given the focus of the current study was on organizations' alliance rather than the interaction with stakeholders, an emphasis on organizations' official website was appropriate. Second, our sample includes organizations from around the world. Although most organizations have websites, social media are not necessarily as common. Including social media connections would introduce considerable inconsistency to our study. Finally, we also manually verified relationships to eliminate irrelevant links.

The data collection took several steps. First, a list of 500 corporations and 441 INGOs' websites was fed into SocSciBot 4.0, which is a web crawler that mines hyperlink data (Statistical Cybermetrics Research Group, 2014). This first step allows the researchers to identify organizations that have documented any connections/relationships to each other on their websites. The obtained hyperlinks were further utilized as "indices" to help locate relevant information. This automatic step is necessary, since many multinational corporations have large websites that are difficult to navigate for human coders. Second, two researchers visited each hyperlink, read the linked web pages or documents, and manually coded the types of cross-sector alliances based on the information included in those texts. Informed by prior research (Austin, 2000), we recognized that there are many dimensions and types of corporate–NGOs relationships. The two researchers first reviewed 20% of all links, inductively developed five categories of relationships, and then they trained two coders to code each relationship into one of the five categories: (1) financial support relationship (e.g., donation) ($N_{\text{link}} = 112$), (2) collaboration relationship (e.g., collaboration on projects) ($N_{\text{link}} = 261$), (3) knowledge sharing relationships (e.g., consulting/information/expertise/knowledge sharing) ($N_{\text{link}} = 1$), (4) adversary relationships ($N_{\text{link}} = 15$) (e.g., NGOs attack corporations for environmental violation), and (5) irrelevant hyperlinks (e.g., NGOs utilize the corporations' product or service) ($N_{\text{link}} = 119$). Because this study focused on cross-sector alliance relationships, only the first three types were included to construct the two-mode network. The two-mode matrix is a rectangular sociomatrix that includes two distinct types of nodes. In the final two-mode network, the row label was made up of the 500 corporations ($N = 500$), whereas the column label was made up of INGOs ($N = 441$). Within this two-mode network, the presence of any cross-sector alliance tie was coded as "1," whereas an absence of such relationship was coded as "0." Overall, a total of 374 cross-sector ties were collected.

Measures

Dependent variable

Cross-sector alliance level. Each organization's cross-sector alliance values were measured by the total number of cross-sector relationships the organization had. For example, corporations' cross-sector alliances were indicated by the total number of relationships with INGOs ($Mean_{\text{cross-ties}} = 2.71$, $Standard\ Deviation_{\text{cross-ties}} = 3.31$), whereas INGO's cross-sector alliances were the number of connections with corporations ($Mean_{\text{cross-ties}} = 3.97$, $Standard\ Deviation_{\text{cross-ties}} = 6.45$).

Independent variables

Regions-of-origin. 941 organizations have headquarters in six major regions, including Africa (N = 33), North America (N = 254), South and Central America (N = 33), Asia (N = 228), Europe (N = 374), and Oceania (N = 16). Five region dummy variables were created with "North America" being the reference group.

Institutionalized democracy index. Government intervention was measured by a proxy taken from Marshall, Gurr, and Jaggers' (2013) Polity IV data. Nations that ranked higher on this scale were viewed as "more democratic," and therefore less likely to influence social actors' alliance building behaviors.

The development levels of financial system. A conventional measure of countries' financial development level is GDP per capita. This study used the data provided by World Bank as expressed in current US dollars (World Bank, 2012). We used the logarithm of GDP per capita to avoid high skewness (Pedhazur, 1997).

Education and labor system. Following Shandra, Shandra, and London (2010), we measured nation's education level by countries' secondary education enrollment rates (World Bank, 2012). This ratio is expressed as a percentage of the population of official secondary education age. Countries with a high percentage tend to have highly educated work forces.

Philanthropy culture. We used the World Giving Index (Charities Aid Foundation, 2012) to measure nations' philanthropy culture. This index measures the scope and nature of giving in 146 countries using questions such as (1) donated money to a charity in the past month; (2) volunteered your time to an organization in the past month; and (3) helped a stranger, or someone you didn't know who needed help in the past month. Countries with salient philanthropy culture were ranked at the top, thus receiving lower numerical values.

Procedure

To examine the structural features of the online cross-sector alliance network, density and centralization scores were first calculated using UCINET (Borgatti, Everett, & Freeman, 2002). The *E–I* index, which measures the extent to which group members are connected to outsiders versus within the group (Hanneman & Riddle, 2005), was calculated to assess the overall tendency of building cross-sector versus same-sector alliances. Gephi's geo-layout function was used to visualize the alliance networks on a world map.

To simultaneously test the five hypotheses, bipartite ERGM was used. Bipartite ERGM represents a recent extension of the ERGM family (Wang, Sharpe, Robins, & Pattison, 2009). ERGMs can model network mechanisms because they account for the network data interdependency issue in modeling (Shumate & Palazzolo, 2010). Bipartite ERGM operates on similar statistical principles as the general ERGM, but ties in this model are defined as connections between two heterogeneous sets of nodes. In our case, the dependent variable is the statistical odd of tie presence (as opposed to the absence of tie) between a random INGO and a random corporation.

The model estimation procedure included the following steps. First, researchers constructed variables corresponding to each hypothesis and included them in the model. After specifying the model composition using the ERGM package in *R*, the program ran a series of network simulations and produced both parameter estimate and standard error for each variable. The interpretation is similar to that of a logistic regression, where the parameter value stands for the log ratio of the given variable in predicting the likelihood of cross-sector tie formation. In ERGM, statistical significance is assessed by dividing the parameter estimate by its standard error, and any t greater than 1.96 suggests a significant relationship, meaning the hypothesized process indeed exists and it significantly predicts the current network configurations.

The composition of ERGM models generally include two parts, the structural variables that are usually included by default and the nodal attributes variables, such as any features regarding the organization. To test each hypothesis, four NBS variables were included to test H_1–H_4. To test

the role of corporations' regions-of-origin (H_5), four dummy variables were included, with "North American" being the reference group.

Results

Network descriptives

Overall, the analysis identified a total of 941 unique and functioning organizational websites, with 46.9% ($N = 441$) environmental INGOs' websites and 53.1% ($N = 500$) corporate sites. This sample consisted of companies from 11 industry fields, and environmental INGOs working on 14 issue areas. Table 1 provided a descriptive summary based on the size of organizations working on each industry field and environmental issue. In our sample, commercial banks (12.01%), specialty retailers (9.25%), and petroleum and gas mining and refining (8.29%) were three largest industry fields, and three most popular environment issues were environmental research and information sharing (9.14%), sustainable development (6.59%), and animal rights (6.59%).

Individual level

The network position of an organization has long been proposed as an important indicator of its influence (Chen, 2009). At the individual organization level, we first identified organizations that enjoyed the high level of in-degree centrality—based on the number of ties an organization received from its cross-sector partners, and those that enjoyed the high level of out-degree centrality—based on the number of ties an organization sent to its cross-sector partners. ING Group (*Normalized In-Degree*[1] = 4.681), Google (*Normalized In-Degree* = 4.096), and United Nations Environment Programme (*Normalized In-Degree* = 3.670) were three organizations that had the highest level of normalized in-degree centrality. Given that in-degree centrality was an indicator of acknowledgement and authority, these organizations were well respected in the cross-sector alliance community.

Table 1. A descriptive summary of corporations working on 11 industry fields, and INGOs working on 14 environmental issues.

	Size	%
Corporations' industry fields ($N = 500$)		
1. Chemical	35	3.72
2. Tobacco	3	0.32
3. Mining minerals or other geological materials	30	3.19
4. Petroleum and gas mining and refining	78	8.29
5. Electric and new energy	27	2.87
6. General merchandisers	34	3.61
7. Specialty retailers	87	9.25
8. Motor vehicles and parts	42	4.46
9. Telecommunications	46	4.89
10. Hotels, casinos, and resorts	5	0.53
11. Commercial banks	113	12.01
INGOs' environmental issue areas ($N = 441$)		
1. Sustainable development	62	6.59
2. Biodiversity	18	1.91
3. Animal rights	62	6.59
4. Forestry and plants protection	37	3.93
5. Climate change	19	2.02
6. Energy	10	1.06
7. Extractive industry watch groups	2	0.21
8. Water resources	51	5.42
9. Waste procession, recycling, controlling of pollution	19	2.02
10. Indigenous people's rights	6	0.64
11. Research and information sharing	86	9.14
12. Promoting local and global connection and networks	50	5.31
13. Foundations	13	1.38
14. Mixed aims	5	0.53

Meanwhile, Greenhouse Gas Protocol (*Normalized Out-Degree* = 2.181), International Emissions Trading Association (*Normalized Out-Degree* = 2.181), World Environmental Center (*Normalized Out-Degree* = 1.809), European River Network (*Normalized Out-Degree* = 1.17), and Earth Policy Institute (*Normalized Out-Degree* = 1.17) enjoyed a high level of normalized out-degree centrality. Since out-degree centrality indicated the actor's intention and actions to develop connections, those organizations could be viewed as actively promoting alliance building.

Sub-network level

The overall network consists of two sub-networks of corporations and INGOs. To assess the extent to which an organization developed internal (i.e., in-group), versus external (i.e., out-group) ties, an *E–I* index analysis was conducted. In SNA, *E–I* index was calculated by the number of ties external to the groups minus the number of ties that are internal to the group divided by the total number of ties. The test showed that the current network had a significant *E–I* index at −.50 ($p < .05$), suggesting that organizations were more likely to connect with same-sector partners than their cross-sector counterparts. An independent samples *t*-test was further performed to see if INGOs and corporations were significantly different on their *E–I* index values. The test was not significant but INGOs (*Mean* = −.432, *Standard Deviation* = .565) did have slightly higher tendency than corporations (*Mean* = −.247, *Standard Deviation* = .627) to build connections with other INGOs.

Total network level

Overall, the alliance ties among the 941 organizations constituted a sparsely connected network, in which only 2% of actors were interconnected and only 230 organizations had at least 1 cross-sector tie. Figure 1 showed the global distribution of cross-sectoral ties. Most ties existed among regions such as Europe, North America, South America, Southeast Asia, and Australia, whereas other regions such as East Asia, Africa, and East Europe rarely participated. To focus on the connection patterns among organizations with at least one cross-sector tie ($N = 230$), Figure 2 was visualized after removing all the same-sector ties. This network consisted of a greater number of corporations (59.13%) than INGOs (40.87%). Across the overall network and the cross-sector tie-only network, corporations tended to attract more connections, whereas NGOs tended to initiate more connections.

Figure 1. Hyperlinks among World Fortune 500 corporations and 421 environmental INGOs, including both same-sector and cross-sector ties.

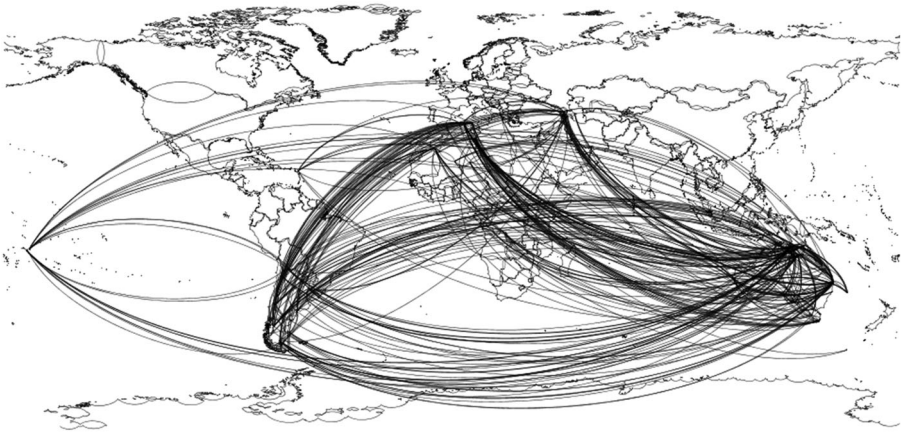

Figure 2. Hyperlinks among World Fortune 500 corporations and 421 environmental INGOs, including only cross-sector ties.

Hypothesis testing

Table 2 provides estimates, standard errors, statistical significance, and conditional odds ratios of the bipartite ERGM model results. In the model, basic structural parameters such as edges (i.e., the total number of network ties) and concurrent node counts (i.e., the number of nodes in the network with degree two or higher) were included as control variables. Five hypotheses were indicated by corresponding nodal attribute parameters, and those were entered in the bipartite ERGM model by specifying a series of nodal attribute effects, using the command "nodefactor" (for a categorical variable) or "nodecov" (for continuous variable) (for detailed glossary and computational specification of ERGMs, see Morris, Handcock, & Hunter, 2008). The final parameter estimates were obtained from a converged model. To interpret the model results, conditional odds ratios should be interpreted as in logistic regression.

The first four hypotheses asked if various characteristics regarding the organizations' countries-of-origin, including democracy level (H_1), the development of financial system (H_2), educational and labor system (H_3), and philanthropy culture (H_4), affected organizations' likelihood of engaging in cross-sector alliances. Among the four, H_1 and H_3 were supported. Specifically, the results suggested that organizations from a society with lower level of governmental intervention were more likely to

Table 2. Parameter values of bipartite ERGM model predicting the likelihood of cross-sector tie formation ($N_{corporations} = 136$, $N_{INGOs} = 94$).

Research questions and hypotheses	Parameters	*S.E.*	Conditional odds ratio
Structural parameters (for control)			
Edges	−4.141***	1.925	−62.866
Concurrent nodes in corporations network	−3.005***	0.356	−20.186
Concurrent nodes in INGOs network	−1.901***	0.290	−6.693
National business characteristics			
H_1 Government intervention	0.029**	0.011	1.029
H_2 Development of financial system	−0.175	0.256	−1.191
H_3 Education and labor system	0.006*	0.003	1.006
H_4 Philanthropy culture	−0.001	0.001	−1.001
H_5: Corporation's region-of-origin			
African	−0.289	0.426	1.335
North American (reference)	–	–	–
South American	0.041	0.219	1.042
Asian	−0.220**	0.042	−1.246
Europe	−0.159**	0.065	−1.172
Oceania (*not in the sample*)	–	–	–

Note: All the parameters were obtained with good convergence. *$p < .05$, **$p < .01$, ***$p < .001$.

establish cross-sector ties at an odds ratio at 1.029 (*Estimates* = .029, $p < .01$). In other words, organizations from a more democratic society were more likely to develop cross-sector ties by 2.9%. In societies with one unit higher of educational level, organizations were also more active in cross-sector alliance building by 0.6% (*Estimates* = .006, $p < .05$).

H_5 asked if corporations' regions-of-origin affect their cross-sector alliances, and the result confirmed a regional difference. With North American corporations being the reference group, the model showed that both Asian (*Estimates* = −.220, $p < .01$) and European (*Estimates* = −.159, $p < .01$) corporations were significantly less likely to engage in cross-sector alliance building than their North American counterparts. Specifically, the results showed that Asian organizations were about 24.6% less likely to have cross-sector ties compared to their North American counterparts, whereas European organizations were about 17.2% less likely. Meanwhile, it did not find significant difference among African or South American organizations. This finding can also be observed from Figure 2, as cross-sectoral ties clearly demonstrated a tendency to concentrate around North American actors, whereas few ties originated from Asia.

After inspecting the significance level of individual parameters, the overall model fitness was assessed by obtaining the goodness-of-fit statistics. The goodness-of-fit measures in ERGM use the Markov chain Monte Carlo maximum-likelihood estimation to compare the observed network with a distribution of simulated networks along the hypothesized properties. The statistics help determine the extent to which the estimated model represents a good explanation for the observed network (Shumate & Palazzolo, 2010). Table 3 showed the results of the goodness of fit for estimated parameters. The convergence *t*-ratio, less than or equal to .1 in absolute value, indicates a good level of convergence (Goodreau, 2007). With all the convergence *t*-ratios well below the threshold level, the results thus suggested that the model indeed well represented the observed network, and all the parameters can be reliably interpreted.

Discussion

Drawing from the NBS literature, this study examines the network structure of the global cross-sector alliance network among Global Fortune 500 corporations and environmental INGOs. Although the overall connections in this network were still sparse, it revealed an emerging trend of global collaboration among the business sector and the civil society actors on environmental issue. This network involved actors with a broad spectrum of backgrounds and from all major regions of the world. However, the global penetration of CSR does not mean that individual organizations from different

Table 3. Goodness-of-fit results for estimated parameters.

Estimated parameters	*t*-Statistic for convergence
Structural parameters (for control)	
Edges	.04
Concurrent nodes in corporations network	−.06
Concurrent nodes in INGOs network	−.07
National business characteristics	
H_1 Government intervention	.02
H_2 Development of financial system	.01
H_3 Education and labor system	−.07
H_4 Philanthropy culture	.05
H_5: Corporation's region-of-origin	
African	.04
North American (reference)	–
South American	.07
Asian	−.01
Europe	.06
Oceania (not in the sample)	–

Note. Model convergence for estimated parameters is indicated by *t*-statistics less than or equal to 0.1 in absolute value.

regions practice CSR in a uniform way. Quite to the contrary, findings of this study confirmed that, theoretically, the NBS approach is a fruitful approach to study international cross-sector alliances, and national contexts profoundly affect CSR communication in general and cross-sectoral alliance building in particular. In this section, we discuss in detail the theoretical implication, methodological implication, and the limitations as well as suggestions for future research.

Theoretical implications

The NBS contends that corporations' CSR agenda is influenced by four major aspects of national background: the political system, the financial system, the education and labor system, and culture (Matten & Moon, 2008). Our results suggest that while political system and educational system powerfully influence cross-sectoral alliance, the financial system and culture are not as strong predictors.

Specifically, our study found that corporations from countries with small government and well-institutionalized democracy are indeed more likely to build cross-sector connections. It is likely that since collaboration among non-state actors is a hallmark of a vibrant civil society (Fukuyama, 2001), organizations from democratic countries are more likely to embrace such traditions and social norms. This finding may also help to explain the regional pattern unveiled in the analysis. We found that at the regional level, corporations from Asia and Europe were significantly less likely to have cross-sector ties, when compared to their North American counterparts. This finding has been consistently documented by previous studies. For instance, Gill, Dickinson, and Scharl (2008) compared online CSR disclosure of corporations from three geographical regions: Asia, North America, and Europe. They found that North American organizations were the most prevalent disclosers of CSR activities online, while Asia and Europe fell somewhat behind. Even though Gill et al.'s study focused on CSR disclosure whereas this study examined cross-sector alliance network, both have pointed to the lack of participation in CSR communication by Asia and Europe-based organizations. Similarly, Kim and Nam (2012) examined hyperlinks reported by Global Fortune 500 corporations, and found Asian companies were considerably less likely to engage in hyperlinking than their counterparts from North America and Western Europe. In the NBS literature, business systems in Japan, Korea, and Taiwan are considered largely similar to the European ones, which are all characterized by "high bank and public ownership, patriarchal and long-term employment, and coordination and control systems based on long-term partnerships rather than markets" (Matten & Moon, 2008, p. 417). Meanwhile, China, as an emerging economic superpower in Asia, is also known for its strong governmental control over market activities. Specifically, most Chinese companies included in the Global Fortune 500 corporations list are state-owned companies, and these companies may limit their collaboration with NGOs for political considerations. In other words, how corporations work with NGOs is a phenomenon profoundly influenced by political systems. Future studies may further explore the mechanisms through which different political systems constrain or enable cross-sectoral collaboration. Nonetheless, although studies (the current one included) have consistently found that Asian corporations lag behind in CSR communication of all sorts, for Asian companies that attempt to differentiate themselves from their competitors and strengthen their brand profiles globally, a closer relationship with trustworthy NGOs may be a good way to demonstrate their commitment to international stakeholders.

In addition, it is also interesting to note that in the context of environmental protection, education level in a nation's labor system is a significant predictor of cross-sectoral tie formation. A possible explanation, as suggested by previous studies (Matten & Moon, 2008), is that in countries with highly educated labor forces, employees and the management possess considerable environmental awareness and they are more likely to support collaborations with environmental NGOs on environmental causes. Future studies may examine if the effect of education persist across issue areas (e.g., human rights, labor rights, etc.).

This study found limited support that financial system and culture affect cross-sector alliance. Nonetheless, this finding does not imply that these national aspects are insignificant in other CSR activities. Future studies may further test the NBS perspective across different CSR activities, and compare which national aspect is most influential on what types of CSR activities. Such efforts are invaluable for further developing the theoretical propositions of NBS, and build a theory that accounts for global CSR trends.

Methodological implications

Furthermore, this study provided valuable implications for CSR research methodologies. Much of the recent literature explores CSR communication through case studies or content analysis. This methodological approach is consistent with the field's pragmatic orientation, but may be inadequate for examining the complexity of cross-sector alliances. The field has witnessed a growing cross-pollination between the social network approach and CSR communication (e.g., Chen, 2009; Fieseler & Fleck, 2013; Fieseler et al., 2010). Responding to the emerging trend, this study demonstrated the utility of using network analysis in mapping the structure of a global CSR cross-sector alliance network.

More importantly, it went beyond a descriptive inquiry by incorporating inferential network modeling, bipartite ERGM, to understand how connections were formed between two distinct organizational communities, the Fortune 500 corporations and environmental INGOs. Inferential network modeling methods have enabled researchers to investigate various mechanisms that explain or predict the emergent processes driving the formation, evolution, and dissolution of cross-sector alliance relationships. In the current study, bipartite ERGM showed its unique advantage in modeling relationships between two heterogeneous network actors. It thus lends direct methodological support to future studies that seek to investigate network ties among two different communities of actors.

Additionally, given the abundance of information available online, this study exemplifies how alternative research methods, which combined automatic data-mining and the rigidity of manual coding, can be integrated as a valuable approach for future CSR studies. This new approach allows researchers to create customized data sets based on existing secondary data sources, as the latter are usually not able to meet different researchers' specific data needs.

Limitations and suggestions for future research

As in the case of many studies, this project also has limitations. Specifically, first, this study has primarily focused on CSR and cross-sector communication and examined cross-sector alliance from the corporations' point-of-view. Scholars may further explore factors shaping NGOs' relationship building strategies. In particular, how corporate reputation and resources may affect NGOs' choices are worthy of further consideration.

Second, the current study only begins to scratch the surface of the power dynamics within cross-sectoral partnerships. It is necessary to acknowledge that although cross-sectoral alliances can offer valuable solutions to pressing societal issues, the interaction between NGO and business have raised concerns. For instance, Andrews and Entwistle (2010) found that business–NGO partnerships do not always generate effective outcomes. Furthermore, others also questioned the issue of resource inequality, dependency, and the potential impact of corporate agenda on NGOs' autonomy and reputation (Selsky & Parker, 2005). In fact, the current study observed that NGOs are far more eager than corporations to establish alliance relationships. Future studies may explore if and how power disparity manifests in cross-sector alliances and what strategies can improve the quality of such relationships.

Third, for a network study, the chosen boundary of the network is both enabling and limiting (Lusher & Ackland, 2010). The current study focused on international actors and it left out

important relationships at the local level. Future studies may focus on a smaller set of countries, and compare how corporations from different regions build connections with NGOs both domestically and internationally. Finally, this study examined the network at one time point. Longitudinal studies of cross-sector alliances help to track the dynamic changes and evolutions in such networks. It is likely that as countries' social and political conditions change, the cross-sector alliance network also evolves accordingly.

In the past decades, as the condition of climate change and other environmental issues continue to deteriorate, environmental issues have played an increasingly important role in modern societies—from politics, business, civil society, and everyday life. Cross-sector alliances around the world reflect an important step towards finding solution. With continued research, we may develop a coherent and integrated theory of global environmental CSR, and apply the theory to facilitate and promote future collaborations.

Note

1. Normalized in(out)-degree is equivalent to standardized in(out)-degree centrality, calculated by dividing the actual in(out)-degree by the maximum degree possible. To use normalized reporting is to ensure the value is comparative across networks with different sizes. The value thus should not be read as the actual ties an organization received (or sent), but rather, a standardized indicator comparable to that from other networks.

Disclosure statement

No potential conflict of interest was reported by the authors.

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