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Abstract

This dissertation sought to examine the virtual structure of global civil society via three theoretical frameworks: World System Theory, World Polity Theory and the current discussion of Network Society. Virtual interactions among 509 INGOs originating from 86 different countries and regions of the world were collected through data mining technology. Findings showed that, respectively, the three theories were significant at macro, meso and micro levels. Furthermore, this study showed that the collective consequence of technology use and the logics of network significantly affected the structure of the virtual networks of global civil society. Findings also revealed a trend of international inequality and Western dominance in the global civil arena. Theoretical and methodological implications were presented in the end.

Introduction

After decades of development and penetration, the Internet has emerged as an essential fabric of our society (Stern, 2008). The Internet is not only a network of computers, but also is a network of human beings, organizations and nation-states (Barabasi, 2002). As noted by Wellman and Hampton (1999): “When computer networks connect people and organizations, they are infrastructure of social networks” (p. 649). Scholars have noted that the unique features of the Internet might impact the communication patterns that take place within the context (Brügger, 2009; Dijk, 2006). Further, the social consequence of Internet use has also been widely studied by researchers (Katz & Rice, 2002; Norris, 2001). One important question concerning the social consequences of Internet use is how individuals and organizations’ use of the Internet affects the development of civil society at both local and global level.

The idea of global civil society is attractive in the sense that a growing network of civil associations acting as an alternative power, independent of nation-states and commercial force, engage in international dialogue, discourse, and the struggle to shape the direction of human development in the interconnected globe. In the 21st century, the whole society witnessed an emerging social phenomenon of immense historical significance: the dynamic interaction of the Internet and global civil society. From the Wikileaks to the revolutions in Tunisia and Egypt in 2011, the Internet helped to unleash the unprecedented networking power of civil actors, and opened up possibilities for the marginalized and disadvantaged to challenge the dominant perspective.

The interactions of the Internet and global civil society have important social implications that deserve serious theoretical speculation and scientific examination. In

addition, one fundamental feature of the Internet is that this is a conducive context for relationship building and expanding. How do civil actors develop relationships in the virtual space? What factors shape civil actors' relationships? Answers to these questions not only contribute to a better understanding of the trajectory of the development of civil society in the information age, but also hold implications for building communication theories that reflect the impact of new media and technology on the human communication process. To address these questions, a structural understanding of the relationship networks among civil actors may be beneficial.

To ground the quest for answers of the aforementioned questions in a theoretical framework, the author embarked on a literature review. An extensive reading reveals that many explanations of the structure of international civil actors' networks have been proposed based on the World System Theory (Wallerstein, 1974, 1979, 1980), the World Polity Theory (Beckfield, 2003; Boli & Thomas, 1997; Shandra, 2007) and the current discussion of the network society (Castells, 1996, 1997, 1999, 2001, 2004, 2008, 2009; Dijk, 2006). Nevertheless, most of the aforementioned theories and models focus on offline communication structure. Through reviewing the literature, on the one hand, the author realizes some of the important implications of this body of literature. On the other hand, it is unclear if theories proposed for offline situations may be directly applied to the virtual context. Questions such as how the nature of the Internet would affect online communication in what ways are still open for speculation. Although some authors have proposed models to theorize the structure of online global civil society, most of them are theoretical papers that lack empirical evidence or are limited within one country. Further, different theories focus on different variables and propose

different explanations to social reality. It is interesting to ask, in terms of the structure of the global civil society, which theory has more explanatory power.

Guided by the aforementioned theories and questions, the author takes on an exciting project that surveyed all the identifiable international civil actors working in the field of environmental protection. The sample included 509 international non-governmental and nonprofit organizations (INGOs) originated from 86 different countries and regions. By collecting their online and offline data, this project provides the first comprehensive description of this group of important civil actors' virtual network structure. This project purposively excluded the relationship between non-profit organization and for-profit organizations to keep the data collection and analysis process manageable. Further, hypotheses and research questions derived from the World System Theory, the World Polity Theory and the current discussion of the network society were tested, and empirical evidence is gathered to weigh the contribution of each theoretical framework. In the end, a few key concepts were identified and implications for theory building and future studies were discussed. The following sections introduce the structure of this project.

In Chapter 1, this study provides a general background on the notion of global civil society. This dissertation argues that the notion of global civil society has two intellectual sources: the discussion of civil society and globalization. Further, as the Internet increasingly plays an important role in global civil society, the chapter also reviewed the dynamic interaction between global civil society and the new media environment. Finally, given the scope of civil society, it is impossible to study every manifestation of this realm. This dissertation focuses on environmental NGOs and their

online connections. Activities and features of environmental civil actors are also reviewed in this chapter.

Chapter 2 advocates for a structuralism perspective on understanding the current world system and the role of global civil actors within this framework. Three competing perspectives on globalization and global structure: *World System Theory*, *World Polity Theory*, and the discussion of *Network Society* are presented. Differences and similarities of these three perspectives are discussed. A number of hypotheses and research questions are derived from the disagreements between the three theoretical approaches.

Chapter 3 reviews the specific features of the network perspective and important concepts of social network analysis. In this project, social network analysis plays a crucial role. Social network analysis was treated much more than a methodology, but a whole perspective of social process. This is because the development of global civil society is contingent on the dynamic interactions among civil actors. Social network analysis is a science of interactions and therefore is a perfect fit for studying the interactive aspect of global civil society. Guided by this perspective, the relationship structure among organizations, and how external factors shape the structure become the center of consideration. Social network analysis offers a wide array of concepts, measures, models, and statistical inference tools to systematically examine the network structures of global civil actors.

Chapter 4 presents the research design, data and measurements. The methodological procedures needed to examine the research questions and test the hypotheses are discussed. International civil actors' websites and social media accounts

are coded and the hyperlink networks among those websites are conceptualized as the interactions between them. Further, dependent variables and independent variables are operationalized. Data collection procedures and data sources are also described.

Chapter 5 discusses the data analysis and results. Implications and conclusions are presented in Chapter 6.

Chapter 1: Global Civil Society

Introduction

The discussion in Chapter 1 aims to clarify the definitions of major concepts involved in this dissertation and to set up parameters for this project. The discussion starts with two important intellectual foundations of the concept of global civil society: civil society and globalization. First, a review of the evolving history of the notion of civil society reveals a rich intellectual heritage of this idea. A unique understanding of civil society is suggested based on the review. Next, this dissertation argues that globalization provided the basic condition in which local civil society can be networked and extended to the global sphere. In comparison to local civil society, global civil society is different mainly in terms of the scale of influence and involved actors. Global civil society is an important manifestation of globalization. Further, because many global civil actors aim at influencing global governance and foster international civil cooperation, their activities in turn affects the course of globalization (Berry & Gabay, 2009). As important agents of global civil society, INGOs are introduced in this chapter. Given the scope of global civil society, it is impossible to study every aspect of this realm. This dissertation focuses on environmental NGOs and their online connection. Activities and features of environmental civil actors are reviewed in this chapter.

The review suggests that the global civil sphere is also a realm of symbolic communication (Anheier, Glasius, & Kaldor, 2004). Media in modern society are important forums for the development of civil society because media construct public narratives and symbols (Stevenson, 2005). The symbolic environment created by media is an important ground for imagined communities (Anderson, 1983). New information

and communication technology, such as the Internet, play an important role in global civil movements and the development of global civil society around the world (Howard, 2011). For example, in 2011, in the so-called “Arab Spring” uprisings, activists in Egypt, Tunisia and Syria used the Internet to organize demonstration and to communicate during protests (Sakbani, 2011).

In the field of new media research, there are two lines of studies investigating the dynamic relationship between civil society and the Internet. At the micro level, scholars examine whether the Internet supports or impedes individuals’ civil participation (Albrecht, 2006; Zywicki, & Danowski, 2008). At the macro level, research has been done to study whether the Internet facilitates civil actors’ social interactions (Bae & Choi, 2000; Yang, 2003b). The current project falls into the second line of studies. The two lines of studies both contribute important insights to inform this project, and therefore are introduced in this chapter.

Global Civil Society

This dissertation argues that the notion of global civil society rests upon two streams of thoughts: the notion of civil society and the discussion of globalization (Kenny & Germain, 2005). Respectively, the two streams of thoughts are both important in providing explanations for some of the most salient contemporary social, economic and political dynamics. In this section, the two streams of thoughts are reviewed, and the important are emphasized.

The notion of civil society: origin and history. The notion of civil society has a long and distinguished heritage in Western thinking, and has been associated with a

variety of meanings over time. Alexander (2006) argues that civil society can be understood as developed through three successive stages.

The first stage started at the late 17th century. Authors such as Locke, James Harrington, Rousseau, Kant and Hegel referred to civil society broadly as institutions existing outside of the state, and such institutions include the capitalist markets. Among the early commentators, Locke (1924) discussed why members of civil society unite to form a government to protect property interests. This reasoning further developed in the eighteenth-century Enlightenment, especially in the writings of Adam Ferguson (1995) and Adam Smith (1993). In *The Wealth of Nations*, Smith suggested that the foundation of civil society is rational economic human beings' pursuing of necessary, convenient and pleasing aspects of human life. Further, civil society is maintained by social orders that consist of private property, contracts, exchanges of labor, and the state's protection of these orders. Kant (1991) emphasized the moral aspect of civil society, and notes that the private interests of members of civil society can be reconciled with universal moral obligation. In the realm of civil society, individuals and the relationships are the ends in themselves and not means to other ends. Hegel (1991) conceptualized civil society as a system of needs. Civil society is the realm in which citizens reconcile private interests with social expectations. The diverse range of human needs and interests are balanced through the mediation of civil society. These early discussions of civil society provide rich and diverse insights on the understanding of the notion. Civil society has many aspects and manifestations, and it is based on the voluntary participation of self-governing citizens and it also has moral implications.

The notion of civil society was further developed by Toqueville. In Toqueville's writing, the notion of civil society refers to voluntary religion, private and public association, organization, and virtually every form of cooperation that contribute to the creation of trust among social members. Civil society is both a description of an ideal social format and assumptions about the potential effect of such social format. One definitive feature of this stage of the notion of civil society is the close association of civil society with the capitalist market (Alexander, 2006). The benign effect of civil society is extended to the capitalist market which leads thinkers of that time to believe that the capitalist system "helps to produce qualities associated with international peace, domestic tranquility, and increasingly democratic participation" (Alexander, 2006, p. 25). The boundary between civil society and the capitalist system is very blurred in this line of thought.

In the mid 1800s, the development of capitalism moved into a stage where its potential problems became increasingly apparent. In Marx's criticism of the capitalism system, civil society, as a concept closely associated with capitalism, was treated as the "field for the play of egoistical, purely private interests... a superstructure, a legal and political arena that camouflages the domination of commodities and the capitalist class" (Alexander, 2006, p. 26). The close association of the notion of civil society and the capitalist market distracted attention to the importance of the concept. During the middle of the nineteenth century, the concept of civil society as an important social concept shortly disappeared. The state and bureaucratic regulation were conceived as the only powerful counterbalance to the instabilities and inhumanities of market forces.

As noted by Alexander (2006), both of the close association of the capitalist market with civil society and the later ignorance of civil society have had regrettable effects. The former concept leads to the over-confidence in the market force that it will self-regulate and create desirable effects automatically. The identification of civil society with the market degrades the moral implication of this concept, and reduces the rich meaning that community ties could imply. In contrast, the second concept leads to the discarding of civil society along with its indispensable benign effects.

In the twentieth century, the notion of civil society started to regain its status as a radical aspiration (Anheier, Glasius, & Kaldor, 2004; Calabrese, 2004). Antonio Gramsci (1971) developed his own concept of civil society. According to Gramsci, civil society is the realm of political, cultural, legal, and public life that is located in between economic and political power. Civil society represents the citizens' struggle for the legitimate use of state power. Gramsci admitted that civil society provides a space for legitimizing the public's quests. To Gramsci, civil society does not necessarily associate with democracy, but still is inherently capitalist.

In recent decades, repeating financial crises has reveal the instability of the capitalist market, and big states such as the Communist regimes were overthrow successively, social scientists' interests on theories of powerful market or big government began to fade (Cannaerts, 2006). Increasingly, social scientists are interested in the role of formal and informal social ties, trust, public participation, and the effect of culture (Anheier, Glasius & Kaldor, 2004; Calabrese, 2004). In *Democracy and Civil Society*, John Keane (1988) describes civil society as the broad realm of social activities which includes private-owned, market-directed, voluntarily run, and

friendship-based organizations. Such activities are recognized by the state, and the members of civil society are “engaged primarily in a complex of non-state activities—economic and cultural production, household life and voluntary association” (p. 14). Those private activities are both social and at the same time may enter the public sphere. These activities could form a solid sphere in which communities are connected and perform culturally defined activities. Ideally, this sphere is sustained by public opinion, shared culture, institutions and organizations.

Civil society was eventually developed into a moral value and a social condition through which other democratic values can be achieved. As noted by Alexander (2006), “it is not the concrete public as a face-to-face association that is fundamental to contemporary civil societies. It is the idea of that public as it has inserted itself into social subjectivity as a structure of feeling. In order to gain influence, actors must speak the language that makes the democratic public into a regulative ideal...public opinion articulates the cultural structure of civil society, defining democratic and antidemocratic opinions, publics, representative figures, and regulative institutions” (p. 72). Autonomy and self-governing are the key words behind the mechanism. Kenny and Germain (2005) contend that the notion of civil society is also used as “an analytic empirical description of the growth of independent associational activities in various regional contexts, notably Eastern Europe, Latin America and Africa, where different democratizing movements are salient” (p.4). Further, social movements are inseparable parts of civil society. Networks of actions and organizations could evolve around certain social movements (Keck & Sikkink, 1998).

In this dissertation, civil society is defined as the structure and communication flows in networks of civil actors and networks of civil networks both online and offline. This definition allows the conceptualization of civil society at multiple levels. At the micro-level, the focus is placed on individual civil actors. To limit the scope of discussion, civil actors are defined as not-for profit voluntary associations. At the meso-level, the project looks at the relationships amongst civil actors, thus, the networks of civil actors. At the macro-level, the project examines the interaction of the networks of civil actors' networks.

This definition offers a new way of explaining the organizational structure and the evolution of civil relationships in the digital era. The definition seeks to go beyond a static or isolated view of civil actions and movements and seeks to analyze both the process and social structures leading to the formation of civil networks and the implications of the different forms of these networks.

The definition also makes no presumptions about the nature of civil society, for networks of civil actors can serve all kinds of purposes. Also, the complex interactions among civil actors and nation states and other social actors make an all-around conclusion about the nature of civil society impossible.

In the current age, globalization has expanded the realm of local civil society to a global level and transnational scale. Globalization is a basic condition of our society (Arrighi, Silver, & Brewer, 2003). Globalization allows civil associations to transcend national boundaries to address issues that involve residents of multiple countries. In the next section, the social mechanism of globalization is discussed, and the connection between civil society and globalization is presented.

Globalization

Globalization is another intellectual foundation of the discussion of global civil society. The current trend of globalization is fuelled by the revolution in information technologies, the collapse of the former Soviet Union, and increasingly fluid international capital flows (Bauman, 1998; Castells, 2008; Richter, Berking, & Muller-Schmid, 2006). To many, globalization not only stands for the promise of wealth and freedom that are sustained or created by the global scale market economy and democratic political system, but it also stands for transnational risk, environmental catastrophes, Western cultural and economic hegemony, and global terrorism (Bauman, 1998; Robinson, 2004).

In this section, globalization as a basic condition of our era and an ongoing process that has brought and will continue to bring profound changes to our society is introduced. Schools of thought that examine different aspects of globalization including the economic aspect, the political aspect and the cultural aspect are reviewed. In the end, the conception of globalization that is applied in this project is laid out.

What is globalization? Abundant literature exists on the topic of globalization (Bauman, 1998; Castell, 2008; Robinson, 2004). Different theories having been proposed to explain the globalization process and the global system in which the process is taking place (Bauman, 1998; Casells, 1996; Crenshaw & Robison, 2006; Giddens, 1990, 2000; Schuler & Day, 2004). Among these competing theories, two schools of definition of globalization are especially worthy of contemplation.

From a Marxist political economic perspective, Robinson (2004) defines globalization as “the near culmination of a centuries-long process of the spread of

capitalist production around the world and its displacement of all pre-capitalist relations, bringing about a new form of connection between all human being around the world” (p. 2).

A close examination of this definition reveals the following insights. First, although many commentators describe globalization as a new social phenomenon, it is necessary to acknowledge the fact that the process of globalization has a long history and it is accompanied by capitalism expansion (Rothschild, 1999). Marx (1867) has described the early history of capitalism expansion as violent and marked with millions of people lost their lives in colonial wars of conquest. In Marx’s (1867) discussion of primitive capital accumulation, he pointed out: “in actual history, it is notorious that conquest, enslavement, robbery, murder, and force, play the great part. The methods of primitive accumulation are anything but idyllic. The history is written in the annals of mankind in letters of blood and fire” (p. 669). Even though the process of globalization is not new, its theorization under the current name only dates back to the 1960s and extensive study of this phenomenon started even more recently (Grewal, 2008).

Robinson (2004) underscores globalization as a “centuries-long” process with capitalist characteristics as the essential nature. Further, the acknowledgement of globalization as a long-existing process does not necessarily deny the novelty involved in this process. In fact, this definition emphasizes globalization is characterized by novel articulations of social power. Novel articulations of social power are accomplished through the formation of new social relationships. Wallerstein (1974) argues that capitalism is the only form of society that incorporates all other types into a single world system, in which no other forms of production relationship play an

important role at a significant scale. Wallerstein (1974) speculates that capitalism expands by commodifying social relations. The process of capitalism expansion replaces non-capitalist production relations with capitalist production relations. This feature of capitalism in the era of globalization evolves into increasingly fluid format that allows capital to spread around the world and penetrate into the most remote regions (Bauman, 1998). The definition also helps to explain the increased mobility gained by global capital. Such mobility allows capital to search out the most favorable condition for maximizing profit, such as cheap labors, loose regulatory conditions (labor laws, environmental regulation, etc.), and stable social environments.

The idea that globalization also bringing about a new form of connection between all human being around the world is consistent with Castell's (2008) argument that globalization brings about the rise of networked society. Globalization deepens connections and makes the connectivity between peoples and countries around the world more complex. The novel aspect of globalization is not the connections among people across borders, but the density and frequency of such connections. As noted by Appadurai (1996): "Cultural transactions between social groups in the past have generally been restricted, sometimes by the facts of geography and ecology, and other times by active resistance to interactions with the other" (p. 27). In the current era, globalization has led to the expansion of all types of social interactions across national boundaries (Giddens, 1990). Restrictions on international and intercultural communication have been largely reduced through the help of expanding social connections and advanced communication technologies and transportation facilities.

In sum, Robinson's (2004) definition of globalization emphasizes three aspects of the process: 1) it is an ongoing process that has last for centuries; 2) capitalism provides an important momentum of globalization and it is the essential characteristic of globalization; and 3) the process of globalization deepens and expands connections among people across borders. Although this definition helps to clarify three important aspects of globalization, it offers little explanation of how globalization affects culture and people's expectation and understanding of the emerging reality. Giddens's (1990) definition of globalization offers a compensative perspective. Giddens's (1990) definition of globalization emphasizes the role of space as it is lived and conceived. According to Giddens (1990), globalization is:

The intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa. This is a dialectical process...local transformation is as much a part of globalization as the lateral extension of social connections across time and space (p.64).

This definition highlights that not only people's experiences of time and space have changed in the process of globalization, but they also need to be aware of such chances. The awareness of globalization is a necessary condition, in which people start to plan and regulate their lives according to the new global condition. Media play a very crucial role in shaping people's awareness of globalization. By being able to get certain information, people are more likely to experience alternative reality and image globalization. For example, the experience that people around the globe get by reading environmental INGOs' mission statements and issue advocacy articles on INGOs' websites, allow them to be exposed to different realities and aware the presence of

global others. Appadurai (1996) notes that the collective experience of the mass media can create sodalities of shared ideologies. According to Appadurai (1996), media, whether produced by private or state interests, tend to be image-centered, narrative-based accounts of strips of reality. These strips of reality offer the audiences a series of elements out of which scripts can be formed of imagined lives, lives of people's own as well as those of others living in other places. These scripts can be disaggregated into complex sets of metaphors by which people live as they help to constitute narratives of the other and possibility of alternative lives, fantasies that could become prolegomena to the desire for acquisition and movement.

According to Appadurai, communities are capable of moving from shared imagination to collective action: "These mass-mediated sodalities are often transnational complexity that, in them, diverse local experiences of taste, pleasure, and politics can crisscross with one another, thus creating the possibility of convergences in trans-local social action that would otherwise be hard to imagine" (p. 8). Further, Appadurai argues that in the globalization processes, the imagination becomes a social practice. This is because imagination "has become an organized field of social practices, a form of work, and a form of negotiation between sites of agency and globally defined fields of possibility...the imagination is now central to all forms of agency, is itself a social fact, and is the key component of the new global order" (p. 31). In other words, media consumption is important to the overall process of globalization and social changes.

Together, these two definitions of globalization underscores that globalization is both an ongoing process and a basic condition of our era. The current trend of

globalization is fueled by capitalism expansion and it has changed the connection among people, organizations and governments across borders. Finally, mass media play a unique and important role in the process of globalization. In the following sections, the aforementioned aspects of globalizations will be discussed in detail.

The economic aspect of globalization. The economic aspect of globalization is one of the most important aspects of this ongoing process (Stiglitz, 2002). Robinson (2004) argues that the rise of transnational capital paved the way for economic globalization. Economic globalization provides the material basis for the emergence of a single global society marked by political, cultural and societal globalization.

Despite its importance, the narrowly defined economic aspects of globalization are especially under debates (Robinson, 2004). In terms of the economic benefits of globalization, it is clear that opening up to international trades has helped many countries grow faster than they would otherwise have done (Richter, Berking, & Muller-Schmid, 2006). International trades help countries to gain profits from exports. For example, China has enjoyed a high-speed development through participating in global trades. To proponents of globalization, the process of globalization represents progress and countries have no other choices but to accept the process. Exclusion out of the globalization would deny a country's opportunity of growth and defeating poverty (Stiglitz, 2002). Yet, after decades of accelerating globalization, despite the fact that the total world income has increased by an average of 2.5 percent annually, international income divide has been increasing over the recent decades and the trend showed no sign of reversing (Stiglitz, 2002). Globalization neither successfully reduced poverty nor

ensured stability. Economic crises have directly threatened the entire world economy (Robinson, 2004).

In the process of economic globalization, Western countries often push developing countries to eliminate their trade barriers while keeping their own barriers. Western countries have driven the globalization agenda and getting disproportionate share of benefits at the expense of the developing world. Not only the economic benefits of globalization are unfulfilled, the environmental and social price is enormous. For example, nation-states' policies such as creating special economic and tax zones to attract inward investments also fuelled the flows of international capital. This trend fundamentally undercuts nation-states' ability to perform key functions. Further, rapid changes brought by globalization often pose too much pressure on countries. Many people around the world were left with little time to adjust to the profound social and cultural changes (Robinson, 2004).

Among economic forces, international corporations are especially powerful in terms of moving capital, goods, and technologies across borders (Tomlinson, 1999). For international corporations, globalization has made it possible for them to avoid paying social security contribution and to externalize negative effect of economic development to the broader community (e.g., create environmental damage in developing countries).

In sum, the economic aspect of globalization is one of the most important momentums of this trend. Economic globalization has united the world into one capitalist system (Wallerstein, 1974). Economic exchanges have promoted other flows of communications across borders. Nevertheless, the social implication of economic globalization is rather controversial. The current global economic system is still

dominated by Western countries (Stiglitz, 2002), and leave millions of people living in developing countries struggle for basic life supplies on a day-to-day basis (Robinson, 2004). Issues of little economic value such as environmental protection, human rights and the interests of marginalized groups cannot be sufficiently addressed by economic forces.

The technological aspect of globalization. The technology aspect is another critical aspect of globalization. Robinson (2004) argues that the current era of globalization is highlighted technologically by advanced information technologies and politically by the failure of socialism and liberation movements to offer an alternative to the capitalist world system. These technologies are based on the revolution in information technology, the convergence of computerization and telecommunication technology and the Internet (Castell, 2008). New technologies facilitate the globalization of capital flows, and remove geographical and material obstacles that may slow down the free moving of capital. Globalization in turn also has made more knowledge and technology available to people in developing countries and around the world (Stiglitz, 2002).

Despite the importance of technology and organizational innovation, globalization is not driven by technological determinism (Bauman, 1998). This is because technology advancement alone cannot determine the direction of globalization. New technologies are developed in response to emerging social realities.

The social and cultural aspect of globalization. Globalization has brought about profound social changes. Castell (2000) argues that globalization has turned our society into a network society. In the network society, globalization is made possible

not only by new technologies, but also by new forms of capitalist organizations and associations. Castell argues that organizations are increasingly characterized by decentralized webs of horizontally interwoven networks. Such organizations are radically different from traditional, vertical, centralized organizations. Workers in these organizations are increasingly treated as a subcontracted component rather than a fixture internal to the employer. As noted by Robinson (2004): “these arrangements have resulted in the creation of vast transnational production chains and complex webs of vertical and horizontal integration patterns across the globe” (p. 19). The concept of network society will be further expounded in the next chapter.

In the discussion of the cultural aspect of globalization, McDonaldization is often used to refer to the global penetration of Western cultural products, consumer goods and habits (Giddens, 2000). An opposite trend is the diffusion of non-Western culture which is globalized through worldwide diaspora communities and the huge number of migrations.

As noted by Appadurai (1996):

The globalization of culture is not the same as its homogenization, but globalization involves the use of a variety of instruments of homogenization that are absorbed into local political and cultural economies, only to be repatriated as heterogeneous dialogues of national sovereignty, free enterprise, and fundamentalism in which the state plays an increasingly delicate role (p. 42).

Thus, globalization of culture is not a simple process of homogenization. Efforts of disseminating and maintaining sameness and difference simultaneously exist both at the global and local levels.

In sum, inherently in the globalization process, tendency such as instability, inequality, crises, and conflicts call for alternatives that lead to a sustainable future. Governments and corporations' inability to sufficiently address pressing social issues brought by globalization is one of the major momentums of the rise of global civil society. As a basic condition, globalization also sets up the context in which the discussion of civil society can be extended to the international arena. In the next section, the formation and function of global civil society will be introduced.

Global Civil Society: Formation and Function

In the latter decades of the twentieth century, the pace of globalization and social change has quickened dramatically (Scholte, 2000). As discussed in previous sections, globalization provides the possibility to transplant the discussion of civil society to the global level. Further, the notion of civil society encourages the examination of the mechanism that either achieves or disrupts order beyond the formal process of political institutionalization and mobilization at the international level. In this section, the concept of global civil society is introduced, and the relationship between globalization and civil society is expounded.

Globalization has deepened governments' reliance on global institutions and organizations for regulation and resolution of transnational problems. Therefore, it is not surprising that the growth of international interactions has been accompanied by a proliferation of transnational civil society associations (Smith & Wiest, 2005). As noted by Stiglitz (2002): "Globalization has been accompanied by the creation of new institutions that have joined with existing ones to work across borders" (p. 9). For

example, new civil groups such as the Jubilee movement have joined established organizations like the Red Cross.

The emerging global civil society adds an important new dimension to globalization. As noted by Stiglitz (2002), although the trend of globalization is hardly new, the increasingly noticeable worldwide reaction against the policies that drive globalization is a significant change. “it is the trade unionists, students, environmentalists--- ordinary citizens----marching in the streets of Prague, Seattle, Washington, and Genoa who have put the need for reform on the agenda of the developed world” (p.9). Meanwhile, civil actors increasingly realize the importance of seeking cooperation beyond national boundaries (Casetells, 1996). Globalization expands and complicates the array of strategies available to civil actors advocating social changes, and shifts the traditional state-bounded discussion of civil society to a transnational arena. More importantly, globalization allows activists to develop networks, especially those forged through the Internet, to bring pressure to powerful governments (Stiglitz, 2002).

Kenny and Germain (2005) describe global civil society as “a growing web of voluntary civic associations engaged in dialogue, debate and struggle over the unfolding direction of the economic and political organization of the world” (p.1). Global civil society represents “an intellectual and political space where alternative routes to economic prosperity and social justice can be explored” (Howell & Pearce, 2002, p. 230), and it can be viewed as a nongovernmental and noncommercial space of association and communication (Jaeger, 2007). Kenny and Germain (2005) note that part of the reason the notion of global civil society attracts so much attention is because

“the ancient dreams of a world citizenship and a planetary-wide political community are strikingly revived by talk of a globalizing civil society” (p. 5). The interests in global civil society also reflect a reexamination of the role of individual and collective agency. The global civil society is a realm where individuals are organized around causes to perform collective action.

The study of global civil society shifts attention to an international domain of voluntary and consensual social relationship. To understand the new configurations of public authority in the contemporary era, and current global social movements in human rights, global justice, humanitarian assistance and intervention, the concept of global civil society is indispensable (Kenny & Germain, 2005).

The formation of global civil society. The conceptualization of global civil society relates to local civil society. Local civil society is formed by local civil actors (e.g., local communities, religious groups, grassroots organizations, labor unions, civic associations, etc.) who articulate and pursue local interests (Putnam, 2000). Global civil society is nurtured by local civil society, but formed by different civil actors. Castells (2008) defines global civil society as formed by “nongovernmental organizations (NGOs) with a global or international frame of reference in their action and goals” (p. 84). As noted by Kenny and Germain (2005), for the diverse public that forms global civil society:

The most crucial elements of these publics are networks of virtual communication, broad-based social movements engaged in criticism of existing political and social relations, media conglomerates that are often attempting to establish media cultures that span territorial boundaries, erode cultural

exclusivity and bridge geographical distance, and the growing legitimacy of the moral worthiness of human rights. (pp. 1-2)

Before start the discussion of global civil society, it is necessary to first briefly introduce a couple of related concepts: nation-states, International Governmental Organizations (IGOs) and International Non-Governmental Organizations (INGOs).

Nation-states. Even the most enthusiastic proponents of global civil society cannot deny the key functions that are performed by nation-states. The concept of nation-states dates back to the Peace Treaty of Westphalia of 1648. This treaty grounded the sovereignty of the territorial state, and limited the claim of universal power made by emperors and popes. After World War I, the treaties of Versailles, St. Germain and Sevres granted all people the right to a state of their own. After World War II, the breakup of European colonial empires and formation of new nations further established a nation-state system that is based on territoriality, sovereignty and cultural identity. Until now, at the international level, world politics are still based on a system of nation-states (Richter, Berking, & Muller-Schmid, 2006). Nevertheless, the prevailing system of nation-states is now challenged by the trend of globalization, which runs simultaneously within and beyond the nation-states system.

International governmental organizations (IGOs). IGOs are international organizations formed among governments. IGOs such as the UN possess no immediate democratic legitimacy because their members are nations and decisions made in those organizations do not directly reflect voters' wills. Although sometimes being conceived as performing similar functions as INGOs, IGOs in fact are organizations between nations, and therefore serve to guard the interests of nation-states. Policies of many

IGOs such as UN and sub-organizations of UN, including International Monetary Fund and World Bank, have profound influence on many countries' development.

International non-governmental organizations (INGOs). INGOs are private organizations pursuing issues of global influence. INGOs form an important part of the global public sphere. The achievements of INGOs have intrigued considerable academic attention (Beckfield, 2003; DeMars, 2005; Ducke, 2007; Hafner-Burton & Tsutsui, 2005; Hall & Taylor, 1996; Meyer, Boli, Thomas, & Ramirez, 1997; Shumate, & Dewitt, 2008). INGOs are studied in multiple disciplines, and scholars attempt to explain NGOs' global influence from diverse perspectives (Shumate & Dewitt, 2008; Stein, 2009). Early success of nonstate actors further triggered the proliferation of NGOs. According to Marlin (2009), INGOs' number increased 20 times from 1997 to 2009.

INGOs are often seen as highly diverse and heterogeneous, with significant amount of knowledge and information resources but limited institutional, military or financial power. With limited resource, INGOs' influence is often explained by the Habermasian notion of the public sphere (Cogburn, Johnsen & Bhattacharyya, 2008).

INGOs are often structured with networked institutional forms, meaning that most of those organizations are organized around loose, horizontal and transnational networks (Cogburn, Johnsen & Bhattacharyya, 2008). Based on their study of human rights issues, Risse et al. (1999) developed a spiral model to explain how transnational advocacy networks become locally effective through the diffusion of norms. The connection of local movements and organizations with transnational social movements and organizations could create opportunities for local social change through influencing

reluctant states. This model illustrates the transformative power of norms and socializing processes achieved through the interconnectedness between global and local networks of activism (Ben-Eliezer & Kemp, 2008).

Boli and Thomas (1997) conducted a survey of staff members working for INGOs. According to the self-reports of these individuals, INGOs are constituted by local individuals considering themselves world citizens. These individuals are determined to influence not only their immediate environment or cultural context, but the life and environment of others who may live thousands of miles away from them. According to these individuals, they purposively look for codes and models that can be easily communicated across countries and cultures, and translate world culture into localized or to some extent localized forms and actions to reveal the alternative reality to local residents. These codes and models include values that widely exist in many cultures, such as safety, personal freedom, care of the body, fair competitions.

More specifically, based on the collected self-reports, Boli and Thomas (1997) summarized five world cultural principles that widely exist in NGOs' missions. These principles are discussed in following paragraphs. It is worth of mentioning that these principles are formed based on INGOs' statements. In other words, they represent the image INGOs strive to create, but not necessarily consistent with the much more complex social reality.

First, universalism assumes that human beings share some universal needs and desires. In essence, human rights are universal. The importance of this claim deserves detailed analysis. The universalism gives NGOs the authority to bypass local authorities. Under the assumption that human rights are universal, then every human, regardless of

his or her citizenship, is eligible for help from NGOs to ensure his or her human rights. Second, universalism allows large-scale cooperation across borders. If human beings can only identify with values or cultures that are unique to a specific area, then international cooperation based on shared value is impossible.

Second, individualism is another widely recognized value among NGOs. Individualism is evident in NGOs' structures. Individual members join NGOs based on their individual wills, and pay their fees or contribute their efforts as individuals. NGOs are collections of individuals. Individualism also is coherent with egalitarianism. In other words, although individuals differ considerably in nature and their social positions, everyone enjoys certain rights and is subject to certain obligations. Everyone is capable of pursuing individual interests, and therefore everyone should be allowed to join certain organizations that can help them to enhance their ability to pursue their needs. This structure downplays NGO members' citizenship or other identification; therefore allow greater mobility and collaboration in a cross-national level. The combination of individualism and universalism generate a belief system in which the common interests among humanity are emphasized. Naturally, the emphasis of common goods undermines the authority of local or traditional authorities and bonds.

Third, rational voluntaristic authority or self-authorization refers to the recognition of rationality as a form of authority. NGOs have no inherent power when compared with state authority or corporations. Much of NGOs' power comes from the assumption that NGOs' suggestions or arguments are based on rational reasons or specific knowledge. Many NGOs are formed by experts of specific fields, such as science, medicine or technical professions.

Fourth, most NGOs eagerly pursue progress or development of some kinds. Boli and Thomas (1997) refer to this characteristic as “human purposes or the dialectics of rationalizing progress” (p. 181). NGOs are characterized by their purposive orientation.

Although by definition, INGOs are non-profits organizations, many INGOs’ activities are heavily concerned with economics. Boli and Thomas (1997) found that in 1988, one quarter of all international INGOs are industry or trade organizations. About one third of INGOs are based on scientific or technology fields. The two types of INGOs account for about sixty percent of INGOs. The basic characteristics of these INGOs, technology oriented, functional ideologies and rational perspectives for instance, also dominate world culture. INGOs discuss current issues, collect data and information, set standards and develop codes. For example, the International Electrotechnical Commission (IEC), which was founded in 1904, regulates and organizes international technical societies.

Although many INGOs are invisible to the general public, they constantly play important roles in institutionalizing many professions and social activities, therefore have far-reaching influence (Taylor, 2004; Tomlinson, 1999). Contrary to some common view, nation-states tend to play little roles when it comes to the formation of global standardization (Smith & Wiest, 2005). Many international standards are developed independent of state influence. These international standards often are distributed during international conferences, and have influence on many people’s lives beyond these conferences. For example, before the foundation of the International Planned Parenthood Federation and the International Union for the Scientific Study of Population, historically, population growth was recognized as one form of nation power

and very little discourse has involved about its negative impact. Population control policies were unheard of by most members of the international society. The foundation of the aforementioned INGOs and their conferences shifted the international discourse on the topic of population. New views associated population growth in third world country with many social problems.

Besides professional INGOs, sports-and-leisure INGOs also represent another type of world culture (Germain & Kenny, 2005). On one hand, in these INGOs, rules and standards are developed and promoted to many countries. On the other hand, these INGOs also promote the shared identity. Every time when there are Olympic Games, the entire world's attention turns to those events. By creating events that can attract global attention, these events create a widely shared culture and memory across nations. Through the help of modern media, international games and events become shared memory of every member on earth. These events create symbolic meanings that forge the construction of a common identity.

There are also INGOs especially focus on protection of rights, values and welfares. This type of NGOs is also known as progressive NGOs (e.g., Amnesty International) (Kenny & Germain, 2005). Civil rights and environmentalist movements have been seen as the central actors of global civil society (Richter, Berking, & Muller-Schmid, 2006).

Although this type of INGOs only account for less than ten percent of the entire NGOs' population, they often attract considerable attention. Environmental and human rights NGOs often become controversial topics heavily covered by media. For this type

of INGOs, the success of their issue depends on public discourse. Maintaining a high public profile is especially meaningful for this type of INGOs.

Like IGOs, INGOs also lack democratic legitimacy. INGOs claim their legitimacy for themselves by referring to just causes and to represent citizens more adequately than traditional political institutions or commercial power (Kenny & Germain, 2005). Some INGOs justify their existence by referring to the insufficiency of nation-states in providing solutions to global problems.

Functions of global civil society. Global civil society seeks to participate in global governance. The goal of global civil society collectively is to provide solutions to worldwide problems. As noted by Calabrese (2004), at the global level, “the advantage of civil society is due precisely to its ability to overflow beyond predictable spheres of influence by the governments of individual states” (p.323). Castells (2008) also notes that the inadequacy of state power to manage global problems leads to the rise of global civil society.

Global governance should not be understood solely as the cooperation among states, but also involves NGOs, civil movements, multinational corporations, and global mass media (Smith, 2002). Global civil society is an inseparable part of global governance. Global public opinion is articulated by global civil society. Actors of global civil society participate in devising, monitoring models and policies of global governance. Global civil society is also an active force that implements those models and policies of global governance.

In the process of global governance, global civil society performs several functions (Scholte, 2000): 1) global civil society politicizes certain issues. Those issues

may not traditionally considered objects of regulations or monitoring by states or official institutions. For example, domestic violence has widely existed in many countries throughout the human history. Only in recent decades, global civil society politicized this issue and brought it to the attention of global public sphere; 2) as an extension of the notion of civil society, global civil society is also assumed as independent outside of the world political system, and challenge world politics “from below”. Global civil society does not belong to the official system of governments, intergovernmental organizations, and corporations, therefore serves as a counterweight to these powers.

The emerging power of the global civil society has been applied to explain the collapse of the Communist bloc (Keane, 2003), rallies against globalizations such as the “Battle of Seattle” movement (Kahn & Kellner, 2004), the rise of NGOs’ global influence (Kenny & Germain, 2005), and the transformation of hegemony in the global capitalist system (Cox, 1999).

Some scholars argue that the current discourse on global civil society further challenges the power of states (Berry & Gabay, 2009; Calabrese, 2004). Some scholars assume that the global civil society represents a third sector that is independent of state power and commercial influence, and is intrinsically benign (Dalton, 2005). Many studies hold these assumptions without questions. Berry and Gabay (2009) contend that the dominant approach to study global civil society is the liberal-cosmopolitan approach. This approach assumes that global civil society takes activities to advance public good in a space that is independent of family, state and the market. Now this space can be located at the international arena. Further, global civil society is viewed as

reflecting cosmopolitanism rather than parochial interests. For example, Kaldor (2005) notes: “global civil society ...is about “civilizing” or democratizing globalization, about the process through which groups, movements and individuals can demand a global rule of law, global justice and global empowerment” (p.20). However, the potential power issues underneath of the global civil society are ignored in the discussion.

The liberal-cosmopolitan approach tends to romanticize INGOs’ activities and civic organizations. Nevertheless, as noted by some scholars, the global civil society may mainly represent the voice of Western-dominated institutions that delegitimize any groups they considered “uncivil”. Therefore, it is necessary to consider that if global civil society is in fact another form of cultural imperialism that provides Western hegemony the excuses to intervene other countries’ affairs. The complexity of this question is further complicated by the global information divide which is characterized by the phenomenon that developed countries have better access to information technology and also dominate the international information network (Norris, 2001).

Further, questions of whether those universal values of global civil society are properly implemented and whether global civil actors and the space where they operate truly hold up to those assumptions are often overlooked.

Civil Society, Communication and the Internet

The rich social implications of civil society suggest that for democracy to function well and for social justice to be maintained, it is necessary for civil society to intervene into non-civil spheres and to initiate demands for reformation. Civil society should monitor the performance of other spheres. At the same time civil society also depends on resource and input from other spheres such as political, economic, religious

and family sphere. It is important to notice that an active civil society is not only a realm of voluntary organizations, legal rights and elections, but also is a realm of symbolic communication (Stevenson, 2005). Castells (2008) also notes that the capacity of social movements to change the public mind depends on their ability to shape the debates in the public sphere. Therefore, it is apparent that for civil society to perform its social monitoring and interests-bridging function, communication is essential. Under the assumption that mass media are important venues for the exchange and expression of public opinion, mass media constitute one fundamental and significant articulation of the imagined and idealized civil domain.

Traditional mass media tend to be based on national system, and could promote a sense of loyalty and obligation towards nation-states. The new forms of communication platform such as the Internet and mobile devices may deconstruct the assumed links between media and local culture (Stevenson, 2005). Further, the new media have the capacity to support collective actions that transgress national boundaries and foster a cosmopolitan mentality (Shirky, 2009).

The emergence of a global information society increasingly draws attention to the role of media and communication technology (Cogburn, Johnsen & Bhattacharyya 2008). Some scholars conceptualize media as an indispensable part of the civil society (Castell, 1996). Castells (2008) notes that NGOs need media to reach the public and mobilize people in support of their activities, and media often become the battleground for NGOs' campaigns. The Internet and the globalization of communication has been lauded as bringing civil society another impetus and opening up new opportunities to globalize NGOs' influence, and "the global civil society now has the technological

means to exist independently from political institutions and from the mass media” (Castells, 2008, p. 86). The possibility of the influence of new ways of communication has unleashed the imagination and creativity of civil actors. For the first time, people have the means to reach an unprecedented mass at the global scale. In the field of communication, the discussion of the relationship between civil society and the Internet can be divided into two lines of research: whether the Internet supports or hampers individuals’ civil participation and whether the Internet facilitates civil actors’ interactions.

The first line of research mainly revolves around Putnam’s (1995) discussion of the effect of time replacement caused by the use of media. Putnam (1995a, 1995b) proposes the time displacement thesis that argues TV watching cause the decline of social capital in the U.S. In response to Putnam’s (1995a, 1995b) time displacement thesis, communication scholars have conducted extensive research to examine the relationship between media use and social capital in the past 15 years (Shah et al., 2005; Skoric, Ying, & Ng, 2009; Uslaner, 1998; Valkenburg & Peter, 2007). Early studies focused on examining the effect of TV watching on social capital (Putnam, 1995b; Uslaner, 1998). As the Internet becomes increasingly popular, studies also examined the effect of Internet usage on social capital. Katz and Rice (2002) examined how Internet use in general affects individual involvement and interaction. Williams (2006a, 2006b) constructed the Internet Social Capital Scale to examine how Internet usage affects individuals’ bonding and bridging social capital. Other studies examined how the use of social networking sites such as Facebook affects users’ social capital (Valkenburg & Peter, 2007).

Findings from these studies yielded contradictory results. Some studies document that the Internet helps users to widen their social circles and maintain interpersonal bonds (e.g., Katz & Rice, 2002; Kraut et al., 2002). On the contrary, research following the “time displacement thesis” argues that Internet surfing displaces individuals’ time which could be spend on real social activities. Further, the replacement does not bring an equivalent benefit to civic engagements (Kraut et al., 1998; Putnam, 1995b). These studies found that the time people spent online negatively associates with the time spent on contact with social environment (Nie et al., 2002). It is still not clear how Internet usage affects social capital or social activities that associate with civic engagement, trust and individual well-being.

The second line of research focuses on how the Internet facilitates civil actors’ interactions. This line of research explores that extent to which computer-mediated communication tools and collaboration practices are used to enhance the ability for civil actors to participate effectively in both local and global policy formulation processes and social affairs. This line of research tends to focus on organizational level civil actors instead of individuals. Taylor (2002) contends that more research “needs to be done to trace the complex patterns and dynamics of networks within this multi-organizational field, at both a micro- and a macro level; from the personal to the local, from the national to the international” (p.344). Echoing to Taylor’s suggestion, this line of discussion directs attention to the networks among civil organizations and organizations that form the environment of civil actors. This dissertation proposes to contribute to this line of discussion.

There are several reasons to suggest that the Internet could facilitate NGOs' interaction and development. First, NGOs tend to have networked structure. Communication technologies such as emails and teleconference help NGOs to communicate more efficiently and share their knowledge and information resources (Coburn, Johnsen & Bhattacharyya, 2008). To achieve their missions, NGOs often need to work with diverse partners. NGOs' projects often involve partners from both developed and developing countries, with different cultural backgrounds and goals. Building trust and common ground, coordinating activities and negotiating interests can be challenging and difficult (Olson & Olson, 2000). The availability of new media technology might help NGOs to better manage their operation. The unique and wide-ranging technologies help to reduce the significant and costly burden of geographically distant collective actions.

NGOs have actively utilized the new media to develop connections and to expand their networks (Yang & Taylor, 2010). Studies suggest that NGOs' virtual connections are not really "context-free". In fact, studies found that organizational characteristics and activities significantly affect NGOs' online connection patterns. Bae and Choi (2000) studied the hyperlinks between 402 human rights organizations and found that most organizations link to others with similar goals and activities. Shumate and Dewitt (2008) found that geographic factors significantly influence NGOs' associations in the virtual context. Shumate and Lipp (2008) found that NGOs' goals and mission also play a key role in influencing NGOs' virtual connection.

New media may help to generate public opinion in a global public sphere. Many argue that global civil society contribute to politicizing issues that have been ignored by

state or international institutions for centuries. Such issues include gender inequality, human rights violation, environmental degradation and developmental issues.

To summarize, for civil actors, the Internet can provide two major benefits: an *information benefit* and a *network diversity benefit*. The *information benefit* refers to the opportunities civil actors obtain because the Internet offers a cheap and fast medium of information distribution. The Internet offers convenient and relatively free-flow means of information distribution. At the global level, no central control exists to filter out any specific content (Albrecht, 2006). Although some governments can control information flows within specific countries, it is impossible to control international information flows. Therefore, the exchange of information of many civil actors is less likely to be limited when compared with other communication channels. These features of the Internet allow INGOs to influence international and national policies through disseminating information or developing awareness campaigns.

The *network diversity benefit* refers to the penetration of the information technology infrastructure around the globe, which allows an increasing number of social actors to link to the Internet. This condition allows civil actors to relatively easily develop ties with multiple social actors. Tie development online is less constrained by geographic boundaries and distance. The Internet supports both asynchronous and synchronous communication, and therefore allows communication to overcome the constraints of time. More importantly, the Internet facilitates the loosely structured networks, weak identity ties and campaigns organized around issues. Bennett (2003) describes these benefits as: “the growth of broad networks despite (or because of) relatively weak social identity and ideology ties; the transformation of both individual

member organizations and the growth patterns of whole networks; and the capacity to communicate messages from desktops to television screens” (p. 164). Therefore, the Internet benefits civil society in ways far beyond reducing the costs of communication or transcending the geographical and temporal barriers of communication. The fact that there are a large number of social actors online and the barrier of communication is largely removed, allows the Internet to support complex and large scale social networks.

Environmental Movement and Global Civil Society

In this dissertation, given the scope of civil society and the limited time and resource the researcher has, instead of studying global civil society in general, the attention will be limited on environmental movement. Castells (1997) defines environmentalism as “all forms of collective behavior that, in their discourse and in their practice, aim at correcting destructive forms of relationship between human action and its natural environment” (p.112).

Environmental movement is a typical example of civil movement and a crucial component of the global civil society. First, environmental movements are very diverse in terms of composition and expressions. Some environmental movements mobilize local communities in defense of their local space and resources. For example, the “*Not in My Back Yard*” movement developed in the U.S. in the late 1970s fought against the excessive development and the building of hazardous facilities. Some environmental movements developed into forms of counterculture such as the ecofeminism (Castells, 1997).

Second, that environmental movement is characterized by its decentralized, multiform, network-oriented and pervasive features. Castells (1997) notes: “The

multifaceted environmental movement that emerged from the late 1960s in most of the world, with its strong points in the United States and Northern Europe, is to a large extent at the roots of a dramatic reversal in the ways in which we think about the relationship between economy, society, and nature, thus inducing a new culture” (p.111). Many environmental NGOs have network structure (Warkentin, 2001). For example, the Earth Island Institute is a consortium of independently functioning campaigns that address a variety of environmental issues. One famous project promoted by this NGOs network is the agreement with U.S. tuna companies to buy only dolphin-safe tuna signed in 1990. The Earth Island Institute has a networked organization structure. The institute has an umbrella organization that is the core. Different projects that meet the organization’s mission of addressing pressing social and environmental issues may be adopted by the institute and campaigns are operated by staff and volunteers. The structure of this organization allows it to be responsive to emerging environmental issues. As new projects join the institute, some existing projects may develop into functioning NGOs that can operate independently (Warkentin, 2001).

The organization structure of the Earth Island Institute is reflected on its website. Different projects of the Earth Island Institute all create websites that are designed to enhance member services, disseminate information and encourage political participation. Different projects develop different website structures and content that reflects their interests, and those projects’ websites to certain also are consistent with the Earth Island Institute parent site.

Third, the growth in environmental NGOs activities and influence coincides with a period of globalization. Globalization facilitates environmental NGOs’

transnational coalition. Further, one of the important goals of environmental NGOs is to confront the power of transnational corporations associated with globalization. In the age of globalization, environmental problems are often caused by transnational corporations that exploit the environment for business benefits. The condition of globalization sometimes limited local governments' ability to limit transnational corporations' behaviors. As noted by Newell (2001): "the intensification of competitive pressures and the mobility of capital conspire to make governments more unwilling or unable to regulate the conduct of transnational corporations" (p.189). Further, since transnational corporations can easily move capital, goods, and service across borders with little consideration for local community and environment, it takes an international coalition among NGOs and government agencies to hold transnational corporations responsible for consequences of their activities.

In sum, environmental NGOs are one type of INGOs that exert significant impact on the global society. Environmental NGOs are diverse in terms of composition and expressions and they often have network structures. Environmental NGOs' coalitions are facilitated by globalization and at the same time, many environmental NGOs aim at resolve some negative consequences of globalization. This dissertation will focus on studying INGOs' online network structure.

Summary

The discussion in Chapter 1 clarifies the definitions of major concepts involved in this dissertation. In this chapter, two important intellectual foundations of the discussion of global civil society: civil society and globalization were discussed. Over time, civil society has been developed into a notion closely associated with the

functioning of democracy values. This notion has moral implications and also is an ideal social condition through which citizenry autonomy can be maintained and state power and market influence can be monitored. Civil society is also a realm of symbolic communication. For civil society to properly perform its function, civil actors need to effectively shape the discourse of the public sphere. Globalization provides the social context in which the notion of civil society can be extended to global civil society. In comparison to local civil society, global civil society is mainly different in terms of the scale of influence and involved actors. Global civil society aims at influencing global governance and foster international civil cooperation. INGOs are major actors of global civil society.

The emergence of new media and communication technology presented unprecedented opportunities for civil society to reach out to the general public and mobilize social movements. This dissertation is especially interested in exploring the dynamic relationship between global civil society and new media technology.

Chapter 2: Theories of the Structure of the Virtual Global Civil Society

Introduction

The Internet forms a vast and growing platform on which computer-mediated communication networks can develop. Further, the fact that this platform supports the convergence of all the previous information and communication technologies increases the importance and potential influence of the Internet to human society. The use of information communication technologies (ICT) has been linked with civil actors' transnational negotiation for social changes and justice (Castells, 1997). Some scholars argue that online based transnational advocacy networks have been increasingly used by global civil actors such as INGOs, grassroots activists, and social movements to leverage their strengths and promote changes at the local, national and global level (Greenberg & MacAulay, 2009).

A considerable number of studies have been conducted to examine the impact of the use of the Internet on the development of civil societies (Biddix & Park, 2008; Chu & Tang, 2005; Yang, 2003). Research reports that civil actors are often early adopters of new technologies (Yang & Taylor, 2010). Studies have also found that civil groups in different countries tend to eagerly adopt websites and social media such as Twitter, Facebook, MySpace and YouTube to advance their causes (Castells, 1996; Greenberg & MacAulay, 2009; Yang & Klyueva, forthcoming; Yang, 2010). These studies often conclude that the Internet empowers individuals and organizations in one way or another; civil actors use the Internet to communicate their missions and goals to the general public, coordinate action across wide geographic distance and influence nation-states' policies.

Stein (2009) contends that the current scholarship on the interaction of the Internet and civil society has followed two threads. In one line of research, scholars conduct case studies of civil society movements (e.g., case studies of the Zapatistas movement by Castells, 1996) to examine how the Internet is used to facilitate identity formation, mobilization and networking. The other line of scholarship focuses on how the Internet enables transnational civil movements (Bennett, 2003). Both schools of research mostly take the form of either theoretical discussion or speculation (e.g., Biddix & Park, 2008; Bennett, 2003). Although conceptual issues are proposed and reflected, little empirical research has been conducted to test theoretical predictions or models.

Another issue that limits the progress in the study of global civil actors' use of the Internet is the lack of a powerful and illuminating theoretical framework. Some studies guided by the World System Theory, the World Polity Theory or the discussion of network society have been conducted to examine the structure of global civil society (Stohl & Stohl, 2005; Yang, In press). However, little effort has been made to compare the explanatory power of these competing theories. Further, most of these studies focus on INGOs' offline structure, and reveal little information about INGOs' online communication networks (Smith & Wiest, 2005)

Further, although some attempts are made to study the virtual global civil society (Shah, Cho, Eveland, & Kwak, 2005; Shumate & Dewitt, 2008), most projects focused on one country or the comparison between two or three countries (Tanner, 2001). A truly cross-national study that pools data from multiple nation-states is rare.

To fill the existing gaps in the literature, this dissertation reviewed compelling theories that may inform a study of the structure of the virtual global civil society, and derived research questions and hypotheses from each theory. These questions and hypotheses were used to guide a cross-national analysis of the virtual structure of the global civil society. In this chapter, three compelling theoretical frameworks: *World System Theory*, *World Polity Theory*, and the current discussion of *Network Society* are introduced. Each of these theoretical frameworks sheds light on the understanding of the structure of civil actors' virtual networks. In this dissertation, structure refers to the stable patterns of use of the online communication media such as organizational web sites and social media (Monge & Contractor, 2003).

Before this study examines the structure of global civil actors' virtual communication, it is necessary to first examine how international civil actors have adopted and utilized websites and social media in their daily operations. As noted by Stein (2009): "Although many scholars view the internet as a potentially useful tool for social movement communication, there is a dearth of scholarship examining whether, how and to what extent most SMOs (social mobilization organizations) use the Internet" (p. 750). To address the issue raised by Stein, the following research question is proposed:

RQ1: How do international NGOs adopt websites and social media (e.g., Facebook)?

This project focuses on the structural aspect of virtual global civil society. Social scientists are interested in social structure because social structures hold implications for the understanding of social actors' performance and behaviors (Barabasi, 2002). As

noted by Castells (2001): “The Internet is a particularly malleable technology, susceptible to being deeply modified by its social practice, and leading to a whole range of potential social outcomes” (p. 50). It is interesting, therefore, to ask how civil actors construct their connections in the virtual space and how such structure affects civil actors’ social impact level. This study argues that the virtual interactions among global civil actors do not take place in a social vacuum. Social actors’ online interactions reflect their offline social relationships (Wellman, 1997). Therefore, by studying civil actors’ online interaction patterns, we can also gain certain knowledge about INGOs’ offline interactions. As noted by Gunaratne (2002), research that examines the communication phenomena associating with the globalization process often failed to take a global perspective. The lack of a global perspective limits researchers’ ability to explain the role of communication in the overall globalization process. The examination of the virtual global civil society should be guided by theoretical frameworks that explain the overall global structure and the role of global civil society within this structure. In the following sections, theories that help to reveal the structure of global civil society are presented. A set of hypotheses and research questions are derived from these theories.

World System Theory

World System Theory (WST hereafter) explains the historical rise of the West and the underdevelopment of most non-Western societies, and explains the world structure resulting from the historical process of Western expansion and domination (Chase-Dunn & Hall, 1994; Chirot & Hall, 1982). WST is political in the sense that it provides the theoretical and ideological foundation for the demands of redistributing

resources and developing new international economic and political orders (Chase-Dunn & Hall, 1994). WST is a powerful and influential theoretical framework because it presents a logical and consistent framework that can be applied to explain empirical data in many countries and across historical periods.

Theoretical background of world system theory. Chirot and Hall (1982) contend that WST evolved as an attack against modernization theories that had prevailed in the 1950s and 1960s. Modernization theories took an evolutionary view of society. Modernization theories hold that history follows a progressive direction. For all types of societies that start the process of modernization, they all follow a path of progress. The path of progress has several stages, although each society may spend different amount of time at each stage, eventually all societies in the world will experience all stages. Modernization theories also explain the rise of Western societies by suggesting that Westerners were motivated by needs for achievement and rationality. All versions of modernization theories suggest that progress can be accelerated by foreign aid, “scientific” ways of better motivating individuals, reformations, or a combination of these factors (Chase-Dunn & Hall, 1994). Modernization theories overlook the possibility that deep structural factors may prevent some societies’ progress and modernity itself can be an obstacle that sustains international inequality. WST criticizes the thesis of uniform stages proposed by modernization theories and suggests that each country goes through a different path of development.

Wallerstein’s WST is deeply influenced by Marxism. Lenin (1939) argued that the reason that capitalism can avoid crisis is because of imperialists’ exploitation of profits from colonial and quasi-colonial areas. Luxemburg Trotsky and Bukharin further

expounded the effect of imperialists' exploitation on semiperipheral and peripheral countries (Chirot & Hall, 1982). These authors contend that it is through the exploitation of semiperipheral and peripheral countries, core countries could maintain a functioning capitalism system. These authors emphasized the importance of world-wide analysis, because only through world-wide analysis, the powerful effect of the overall world system can be illustrated.

In the discussion of WST, the relationship between core and peripheries is similar with the relationship between Marxism's notion of capitalists and the exploited proletariat (Chirot & Hall, 1982). Further, the Marxist notion of class conflict is expressed as international conflict. WST describes a capitalism world system. In such a system, a socialist revolution would not succeed in any single country. Socialism can only fully develop in a socialist world system.

Dependency theories form another intellectual origin of WST. As noted by Portes (1976):

Contemporary dependency studies address a situation in which domestic industrialization has occurred along with increasing economic denationalization; in which sustained economic growth has been accompanied by rising social inequalities; and in which rapid urbanization and the spread of literacy have converged with the even more evident marginalization of the masses (p. 75).

Dependency theorists argue that investments of developed countries in developing countries impair the long-term prosperities of those developing countries. Further, since developed countries tend to control technologies and high-end industry

sections, developing countries tend to become increasingly dependent on developed countries over time.

Central thesis and key concepts of world system theory. This section provides a detailed discussion of the central thesis and key concepts of WST. WST takes a structuralism perspective, and assumes that nation states' behaviors and conditions depend fundamentally on the world system (Wallerstein, 1974, 1979, 1980). WST assumes the world system is an interconnected network, and countries hold the network positions of core, semiperiphery and periphery. Different positions imply different power relationship among countries. Essentially, the overall structure of the system allows core countries to exploit semiperiphery and periphery through unequal distribution of social wealth and division of work (Wallerstein, 1974, 1979, 1980).

World system. WST explained the historical origin of the current world system (Wallerstein, 1974). WST describes the process of societies evolve from isolated "minisystems" into an interconnected global network. Societies that belong to minisystems are isolated entities with complete division of labor within each society. At certain periods, all societies are minisystems (Wallerstein, 1974). Such minisystems sometimes were temporarily conquered by world empires, but it is the capitalism world-economies that eventually spread throughout the world. Currently, this logic of the international system is so pervasive that no country can escape its influence (Wallerstein, 1974).

The world system is a connected international network and is composed of three structural positions: core, semiperiphery, and periphery (Chirot, 1977). The linkages among the three positions are developed in a way that, on the one hand, facilitate the

core's exploitation of the semiperiphery and periphery; on the other hand, form structural barriers against economic growth in semiperiphery and peripheral countries (Snyder & Kick, 1979). This international structure and international division of labor reinforce each other in an ongoing manner. As the core extracts resources from the semiperiphery and periphery, the semiperipheral and peripheral economies grow more externally oriented (emphasizing dependency) and specialize in raw-material commodities. The world system is a capitalist world economy with a relatively stable structure (Chirot, 1977). This system is largely self-regulated and self-sustained, with dynamic internal developments (Wallerstein, 1974).

The role of core, semiperiphery and periphery. Core countries tend to specialize in “capital intensive technology and relatively skilled and highly paid labor” (Chase-Dunn, 1998, p.346). Peripheral countries, in contrast, specialize in “using technology which is relatively low in capital intensity and labor which is paid low wages and is usually politically coerced compared to labor in core areas” (Chase-Dunn, 1998, p.347). Hence, core countries tend to gain a large share of the surplus while peripherals are left with a slim share of the surplus.

Wallerstein (1980) also emphasizes the importance of the semiperipheries, societies that stand between the core and periphery in terms of their network positions and economic power. Some semiperipheries could rise into the core, such as Japan, and some may fall into periphery, such as Spain in the 18th century. Semiperipheries tend to demonstrate mixed features of core and periphery. The existence of semiperipheries demonstrates the mobility of the relatively stable world system, and is an indispensable part of the world system. Chase-Dunn (1998) credits the concept of semiperiphery as

“one of the most fruitful concepts introduced by Immanuel Wallerstein” (p. 210) because it helps to explain how core-periphery hierarchies are created and perpetuated. The existence of semiperiphery decreases the likelihood that exploited countries would collectively break the exploiting relationship. The existence of semiperiphery distracted opposition and resistance against core countries, and become a baffle zone that separates the direct conflict between core and periphery (Wallerstein, 1974, 1979, 1980).

Central thesis. The central thesis of WST is the relationship between core and peripheries (Wallerstein, 1974, 1979, 1980). Core countries extract surplus from peripheries to fuel the expansion of the core. Core countries draw primary resources and products of cheap labor from periphery. The periphery gets minimum profits out of the exchange. As the core increasingly exploits the periphery, the gap between them also increases.

Power issue in world system theory. WST suggests there is a “hierarchical continuum of power among countries” (Babones, 2005, p.33). The power difference among nation states is largely a by-product of the international division of labor and the dependency relationship between the peripheral and core (Chase-Dunn, 1998). Power is also reflected by countries’ capacity to change their position in the world system (Chase-Dunn & Hall, 1997).

Criticism. A major criticism to WST is that although WST proposes states have distinct network positions in the world system, WST does not provide clear operational criteria for classifying countries according to core, semiperipheral, or peripheral locations (Babones, 2005; Clark & Beckfield, 2009; Snyder & Kick, 1979). Wallerstein

(1974) acknowledges the fact that the three-tiered classification is not exclusively based on economic development. Rather, multiple dimensions underlie the concept of position. Therefore, it is difficult to precisely classify countries. As argued by Snyder and Kick (1979): “empirical treatments have no clear way in which to validate either the specified number of positions or the structural relations among them” (p. 1102). Snyder and Kick (1979) further advocate for addressing WST from a structural perspective. In other words, instead of using economic development or trade concentration measures, researchers should classify countries based on their structural position and structural relations among positions. Such a perspective reflects the assumption that actors’ behaviors are influenced by their structural positions. Studies following this perspective have applied network analysis to patterns of trade, economic, political and military relationships and some studies have found a three-tiered structure emerging from these networks (Babones, 2005; Kick, 1987).

Theoretically, Brenner (1977) criticizes WST as creating a reversed causality. In other words, it is not the dependency that creates lack of development, but the lack of development produces the dependency. Chirot and Hall (1982) note that world-system theorists share an enthusiasm in proposing socialistic solutions to problems, and some of their analysis may not be objective.

Further, WST features a nation-state centered model. However, many modern international activities are not structured neatly within national borders. To take international commodity flow as an example, the production of one simple commodity may take place in multiple countries. Another problem associated with the exclusive attention on nation-states is the lack of accountability of WST to other factors that

powerfully influence the current world system and globalization. Meyer et al. (1997) note that WST ignores the important influence of world culture. WST assumes that economic, power, and national interests are the driving force of global change and that world culture has little influence on global structure and international affairs. Under this model, global discourse would not exert much influence on nation-states' policies, nor would civil actors since they lack economic or political power. WST assumes that international organizations are controlled by major nations, and reflect national interests in different local arenas.

WST is one of widely cited theories that has been applied to explain the structure of international relationships and the role of civil society. The next section discusses implications of WST and a set of hypotheses and research questions derived from WST.

Implications for the structure of global civil society's virtual network. WST suggests that essentially, economic relationships among nations represent the primary organizing principle of the structure of international interaction. Further, the structural position of a country determines its interaction patterns, and its interactions with other countries reinforce the country's position within the world system. WST argues that the existing international structure reinforces the power relationships underlying nation-states. In other words, the structure of civil society would reflect the predominant power inequalities between core and periphery countries that persist in the state and commercial sectors (Smith, 2002). Therefore, following this logic, it is interesting to examine the relationship between each country's economic development level and the network centrality position of INGOs that originated from this country. Research

question 2 was proposed to guide an investigation of the potential effect of economic context on INGOs' network centrality.

RQ2: What is the relationship between an INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the economic development level of the organization's country-of-origin?

Further, countries' development level of democracy as a variable closely associating with economic development is also widely used in WST studies (Milner, 2009; Snyder & Kick, 1979). It is possible that in countries with well developed democracy system and tradition, INGOs will find more support to develop both online and offline. To test the validity of this assumption, research question 3 was proposed to examine if a country's democracy level affects the network centrality of INGOs originated from the country.

RQ3: What is the relationship between an INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the democracy level of the organization's country-of-origin?

Further, WST argues that countries' world system positions have a profound impact on international relationships and states and non-states actors' communication patterns (Smith, 2002). Therefore, it is interesting to examine if organizations originating from the same world system categories are more likely to cluster together. In network studies, network component structure describes the clustering pattern of nodes.

Research question 4 was proposed to explore the impact of a country's world system position on the network clustering patterns of INGOs originated from the country.

RQ4: What is the relationship between an INGO's virtual network component structure and the world system positions of the organization's country-of-origin?

WST assumes a hierarchical international communication structure in which core countries occupy the central positions in the network while peripheral countries take peripheral positions. A country's network position determines its potential for development and interaction patterns. Although traditionally, world system theory has ignored the exchange of information among international actors, recent studies have found that countries' world system positions do significantly predict countries' positions in the international communication and telecommunication network (Barnett, 1999, 2001, 2002; Barnett & Choi, 1995). Recently, a line of research examined how the world system affect international news flows (Chang, Lau, & Hao, 2000; Kim & Barnett, 1996; Wu, 1998). Although some states tend to change their status over time, most countries' memberships in the world system and their relationship with other countries are relatively stable (Chase-Dunn, 1989). Further, WST assumes that the nation-states are the central actors in the international arena, and organizations and civil actors are agents of nation-states. Therefore, the following hypothesis can be proposed:

H1: The structure of INGOs' virtual communication network presents a core-peripheral pattern.

This hypothesis directs attention to the overall structure of this network and requires the applying of network methods. Hargittai and Centeno (2001) note the virtues

of applying network method to the study of world system helps to “the underlying pattern of the literally millions of sets of ties across the globe” (p. 552). The core actors are those that emerge as central to the global networks. Therefore, it predicts a block model such that instead of describing information about individual actors, the model reveals a general feature of a network. This method has been used to study international economic networks (Snyder & Kick, 1979), interorganizational networks (Knoke & Rogers, 1979), and other group structures (White & Breiger, 1975).

WST highlights that civil actors are not operating within a social vacuum. Many civil actors are funded by governmental agencies. Therefore, it is possible that some governmental agencies may fund civil actors as agents to advance their goals (Olesen, 2005). This does not suggest that civil actors do not have autonomy. Civil actors may struggle to maintain their autonomy through diversifying funding sources. However, resource providers in core countries can still place constraints on civil actors’ program objectives, performance evaluation, and funding requirements (Ben-Eliezer & Kemp, 2008). Therefore, civil actors’ world position may reflect the positions of their countries-of-origin. Therefore, the following hypotheses can be proposed:

H2 (a): INGOs’ network centrality as measured by indegree centrality is significantly predicted by the world system positions of environmental INGOs’ countries-of-origin.

H2 (b): INGOs’ network centrality as measured by outdegree centrality is significantly predicted by the world system positions of environmental INGOs’ countries-of-origin.

H2 (c): INGOs' network centrality as measured by (incoming tie) closeness centrality is significantly predicted by the world system positions of environmental INGOs' countries-of-origin.

H2 (d): INGOs' network centrality as measured by (outgoing tie) closeness centrality is significantly predicted by the world system positions of environmental INGOs' countries-of-origin.

H2 (e): INGOs' network centrality as measured by betweenness (Freeman Betweenness Centrality) is significantly predicted by the world system positions of environmental INGOs' countries-of-origin.

Network centrality is a particularly significant measure because the World System Theory proposes that the international network is structured along a center--peripheral dimension (Beckfield, 2008). Actors with high network centrality can be understood as possessing core positions.

WST suggests that actors from core countries tend to dominate the international information flow since core actors possess more resources. WST also suggests that core country actors are at the center of communication traffic. One indicator of a civil actor's network diversity is the number of visitors to a civil actor's website or the number of followers for a civil actor's social media account (Chase-Dunn, & Hall, 1994; Chase-Dunn & Grimes, 1995). Therefore, the following hypotheses were proposed:

H3a: The numbers of visitors to environmental INGOs' websites are significantly influenced by the world system position of environmental INGOs' countries-of-origin.

H3b: The numbers of followers to environmental INGOs' Facebook accounts are significantly influenced by the world system position of environmental INGOs' countries-of-origin.

Overall, the World System Theory suggests that the communication structure of global civil actors' virtual networks should present a core-peripheral structure.

Essentially, the communication structure of global civil society based on the fact that World System Theory emphasizes the power issue that underlies global civil society, and suggests that civil actors originating from core countries would dominate discourse in the global public sphere. If network actors' centrality, prestige and impact level online are significantly predicted by these actors' countries-of-origin, this may suggest that civil actors' positions and behaviors are largely a function of their respective countries' world system positions. Therefore, global civil society may not be a distinctive sphere, but an international arena that is dependent upon nation-states.

World Polity Theory

Globalization has brought considerable changes to the human society. Nowadays, many people have observed remarkably similar features of nations' policies, institutions and structures. Across countries, many professions, norms, social movements and even people's entertainment forms are similar (Boli & Thomas, 1997; Meyer et al., 1997). Such similarities exist despite huge differences among nations in terms of their history, social, and economic environments and available resources. These similarities suggest a trend of structural, institutional and cultural isomorphism at the global level. The mechanism that causes global isomorphism naturally invites scholars' speculations and interests (Boli & Thomas, 1997; Giddens, 2001). Further, the

rise of nonstate actors such as international corporations, international governmental organizations (IGOs hereafter) and international non-governmental and nonprofit organizations (INGOs hereafter) has attracted a great attention across nations.

Worldwide, large scale population mobilization through migration and tourism also has suggested that human beings are communicating in new and unprecedented patterns (Castells, 1996, 2008).

World Polity Theory (WPT hereafter) provides a sophisticated theoretical framework from the neo-institutional perspective to understand the aforementioned phenomena and explain the role of nonstate actors, especially IGOs and INGOs in the globalization process. In this dissertation, the theoretical background, central thesis and key concepts of WPT, along with criticisms of this theory are reviewed, and a case is presented to illustrate the explanatory power of this theory.

Theoretical background of world polity theory. WPT essentially is a theory of globalization and the power of world polity ties such as a country's involvement with INGOs and international treaties. It is based on neoliberal institutionalism and adopts a systematic network perspective. This theory provides alternative explanations for emerging phenomena in international activities and international politics and relationships, and emphasizes the power of institutionalization through global level symbolic processes (Beckfield, 2003, 2007).

Realist international theories such as world system theory used to dominate the discussion of international politics and relationships (Tilly, 1991; Wallerstein, 1983). Realist theories assume that nation states are rational actors. International relationships and activities are based on the calculation of interests and national needs. The realism

perspective either sees nation states as actors in an anarchic or in a networked world, and their relationships are defined by competitions and exchanges (Wallerstein, 1983). Further, political, military and economic powers determine a nation's position in the world system (Wallerstein, 1983).

Since the late 1970s, and throughout the 1990s and 2000s, to compete with the dominant realism paradigm, neoliberal institutionalists have developed an alternative theory: WPT. Keohane (1983), in his book, *After Hegemony*, shifted the research focus from international competition to international cooperation and interdependency and provided a firm foundation and theoretical justification for later works. The line of research that follows Keohane (1983) emphasizes trends and forces that promote the international flow of information, population, norms and standards, and paves the way for increasingly apparent globalized cooperation.

Both neoliberal institutionalism and neorealism adopt a systematic theoretical perspective. The systematic perspective emphasizes the powerful, and sometimes even overwhelming influence of structural, external influence. In other words, a country's network position in certain types of global networks has significant influence on the country's activity in that area. This perspective is fundamentally different from the classical realism perspective, which sees nations as actors in an anarchic world, and their relationships are characterized by competition over resources and economic or political interests. Both neoliberal institutionalism and neorealism acknowledge that nations are bounded by interdependency relationships and networks (treaty networks, trade networks, etc.), and their activities and development are to a large extent, constrained and shaped by their network position. Both neoliberal institutionalism and

neorealism adopt a positive and rational epistemology, and develop sophisticated measures and research procedures to test their respective concepts and central propositions. For example, social network analysis is widely used by both schools to study the structure of different types of networks (Beckfeld, 2001, 2007; Milner, 2001).

Nevertheless, significant differences exist between the two theoretical perspectives. The neorealism perspective follows a reductionist logic and Marxism materialism, and reduces the essential motivation of international interactions to national interests. Nation states are key players in the international arena. Nonstate actors such as IGOs or INGOs are just representations of nation-state networks or an international interdependency relationship. In the realism paradigm, the roles of international civil actors are often underestimated or overlooked. In contrast, neoliberal institutional theorists conceptualize nation states as actors of an interdependent network. Their actions are not only shaped by interests, but also by international trends and world culture. Further, nonstate actors such as international corporations, IGOs and INGOs also play important roles. For example, environmentalism promoted by NGOs profoundly affected many nation states' policies (Newell, 2001; Warkentin, 2001).

In the next section, the central thesis and key concepts of WPT are discussed and criticism of WPT is also presented.

Central thesis and key concepts of world polity theory. *Central thesis.* The central thesis of WPT is that “features of nation-states are derived from worldwide models that are constructed and communicated through world cultural and associational process” (Meyer et al., 1997). This central thesis describes a global isomorphism process. Based on this central thesis, WPT not only describes a globalization process,

but also predicts the ultimate outcome of the process: an increasingly homogeneous world. The central thesis is formed based on the following key concepts of WPT and their relationships: worldwide models, world culture, actors of the polity network, the global polity network, isomorphism and decoupling.

Worldwide models. Worldwide models are formed based on widely accepted values (such as human rights, socioeconomic development, environmental protection, etc.) and development models established in developed nations. Worldwide models help to explain the strikingly similar structural, institutional and cultural features across nations. In a simple expression, nations are similar to each other because they all follow similar models.

Worldwide models provide justification and legitimacy to many social movements, institutional structure and reform. For example, the constitutional arrangements in many nations follow similar logic and rules (Meyer et al., 1997). Worldwide models also profoundly influence many aspects of social life such as norms, standards and institutional culture. For example, across nations, journalism codes are similar, and convey similar values such as objectivity, timeliness and social responsibility to journalism practitioners and shape their everyday practices (Shoemaker et al., 2000; Yang, 2010; Yang, forthcoming).

World culture. World culture is an important theoretical contribution of the world polity theory. The concept of world culture essentially proposes a bold yet important idea: a cultural framework that is bigger than nation-states (Boli & Thomas, 1997). Although many have observed evidence of this cultural framework, scholars have hesitated to propose a culture at this scale (Boli & Thomas, 1997). World culture

is a culture that functions independently of nation-state and exerts considerable influence on nation-state behaviors. Culture is global, meaning that principles, norms and purposes are cognitively structured similarly across nations. It also means that worldwide models that are communicated through world culture are assumed to be universally applicable and influence people's thinking at an ontological level. These models are taken for granted and therefore are rarely questioned. For example, government is assumed to be essential for coordination and social order, so every country has to have a government. Mass schooling is held to be important for national development, so mass schooling systems are promoted in every country in the world. Other examples are banking systems, socioeconomic development and democracy. Such models are often promoted and advocated worldwide without questioning their effectiveness or applicability.

World culture recognizes that nonstate actors, such as international corporations, IGOs and INGOs, along with treaties and international conferences are forming an increasingly widened and thickened global polity network. In other words, more and more nations and international organizations have become part of this network. Furthermore, actors' interactions through this network are increasingly frequent (Demars, 2005). World culture and models, also called policy scripts are communicated through such networks (Meyer et al., 1997). Especially, Boli and Thomas (1997) argue that the nature of world culture is embedded in international organizations such as INGOs. By studying the mission, operation and structure of INGOs, we can deepen our understanding of the nature of world culture.

The existence of world culture, according to world polity theory, does not deny the complexity and difference among local situations and local cultures. Rather, the promotion of world culture is bound to cause disarticulation between ideal and reality and even conflicts at the local level. Such inconsistency and conflict will still exist for a very long time. However, the significant and overwhelming influence of world culture is pervasive and penetrating, and is causing and will continue to cause the world to become increasingly similar (Risse, Ropp, & Sikkink, 1999). People who have traveled around the world cannot help but notice how similar buildings and streets in different cities, especially metropolitan areas (e.g., Shanghai and New York, Tokyo and London, etc.) are. Although different local culture still significantly defines local life, the overwhelming influence of world culture is also undeniable.

World culture is not a coherent entity (Olesen, 2005). World models are constantly negotiated among actors through various forums and conferences. World culture consists of competing models. These models even conflict with each other and sometimes cause considerable negative consequences (Drori et al., 2001).

The idea of world culture also challenges a basic assumption of realism: nation-states are rational actors (Mueller, Pag é, C & Kuerbis, 2004.). World culture suggests that nations may also act irrationally and adopt models without demanding proof of effectiveness or efficiency. Furthermore, nation-states' behaviors are influenced by cultural heritages. Nations with different cultures may behave differently in international affairs. The introduction of culture into international relationships study is a central contribution of World Polity Theory.

Actors of the world polity network. In World Polity Theory, actors are not given entities or static entities such that their nature need not be studied. Rather, actors are symbolic constructions. This conceptualization suggests that the nature, purposes, and actions of actors (including individual organizations, nations, and social movements) are constantly changed by the world cultural frame.

Important actors of the world polity network are nations and international organizations, especially IGOs and INGOs. In world polity theory, nations are conceptualized as not only being influenced by their respective culture, history and other internal factors, but also by the external factors such as world culture, international trends and the world polity network.

INGOs and IGOs are carriers of world culture. They create, embody and diffuse world models around the world (Beckfeld, 2007). According to the previously discussed survey (Boli & Thomas, 1997), individuals working for IGOs and INGOs often consider themselves world citizens. These are individuals who are determined to not only change their immediate environment, but also the life of people who live thousands of miles away from them. These individuals translate world cultural models into localized, or partly localized languages and formats, and communicate these models to local people.

WPT suggests that INGOs and IGOs exert influence in the following ways. First, INGOs and IGOs shape the language of treaties and codes of ethics, thereby influencing the normative context of institutions. Second, INGOs and IGOs often monitor the accountability of states and business (Keck & Sikkink, 1998). Third, INGOs and IGOs mobilize financial and other types of resources for problem-solving

when local actors lack adequate avenue. Fourth, INGOs and IGOs frame the public discourse in a manner that encourages social movements (Shandra, 2007). Therefore, nation states that have more ties with INGOs and IGOs are more likely to be subject to their influence.

For example, Shandra (2007) found that ties with INGOs, IGOs, and treaties, controlling for other factors, have an effect on limiting countries' level of deforestation.

As noted by Monge and Contractor (2003), communication plays a central role in the global embedding and disembedding process by providing the knowledge, perspective and assumptions that allow people to envision alternative possibilities. The type of communication promoted by IGOs and especially INGOs provide such alternative thinking for many people around the world.

World polity network. The world polity network conceptualizes the emerging global network formed by individuals, organizations and nation states that communicate internationally. Some aspects of this network are not entirely new. For example, civil society has existed for hundreds of years and has been competing with state power and commercial influence for a long time. However, it is argued that the network structure and scope of the world polity network is new (Beckfeld, 2003). This network may emerge as an alternative power that balances the influence of nations' networks and commercial networks and forms an important dimension of the emerging global networked society.

Further, the efficiency of polity scripts depends on a nation's position in the polity network. Studies have found that nations located in the center of the polity network, or nations with rich ties, tend to adopt world models faster and more

completely. In contrast, nations located in peripheral locations of the polity network, or nations with fewer ties, tend to adopt world scripts more slowly and with more observable disarticulations (Beckfeld, 2003, 2008).

Isomorphism. WPT proposes that the global institutionalization process takes place through the mechanism of isomorphism. Isomorphism is a constraining process that forces a unit in a population to resemble other units that face similar environmental conditions (Powell et al., 1984). Isomorphism is the mechanism through which nation states adopt world models.

WPT suggests that at the international level, isomorphism is made possible through three forces. First, actors such as nation states turn to world culture for legitimacy and identities. Modern nations often claim legitimacy and identity by adapting to essentially similar world models (DiMaggio & Powell, 1983). For example, many nations have based their identities on constitutions that are essentially similar. The adaptation process makes nation states become similar to each other in terms of institutional structures. Second, the systematic maintenance of actor identity helps to ensure the process. After a nation adopts certain models or world values, when the nation violates such values, it may face international sanctions or the invention of international activism groups. Further, world culture also legitimizes sub-national organizations while legitimizing nations. The simultaneous adoption means both parties will hold each other accountable (Meyer et al., 1997). In the process of isomorphism, sometimes nation states have problems fully embracing new policies or institutions, and those are the situations where decoupling may emerge.

Decoupling. Decoupling is, to certain extent, an inevitable consequence of globalization. Decoupling refers to the inconsistency in the practice and institutionalization process of world culture. Decoupling exists because those institutions, policies and models that nations have enacted are of external origin and inevitably cause inconsistency between the intention behind policies and the actual implementation process (Meyer et al., 1997).

However, although some suggest that decoupling means that in the adopting process, nothing really changes local practice (Drori et al., 2001). Such a view is simplistic. Even with the presence of decoupling, local institutions may still be changed to an extent because although the relationship between models and their effect is unstable or has lagged behind, over time, those models will still penetrate local practice. Further, in different countries, the prevalence levels of decoupling are different. However, the problem is that the expansion of world models takes place at a faster rate than any correction to these models. Such a situation creates a permanent crisis in which more institutionalization causes more decoupling and social problems, which in turn calls for more expensive reform (Drori et al., 2001).

Further, scholars argue that weak states that lack sufficient social resources turn to focus on adopting world models instead of fully implementing those models (Meyer, Boli, Thomas, & Ramirez, 1997). Weak states, such as states that are lagging behind in terms of economic development, when compared to developed nations, have a much harder time to solve the decoupling issue. Therefore, in weak states, observable decoupling phenomena occur more often and tend to cause more social problems.

Criticism. Despite its powerful explanatory power, WPT does not go without criticism. Some scholars argue that this theory overlooks power issues which still underlie international relationships. As argued by Castells (2008), one important motivation for communication is power. For nations and organizations that are eagerly participating the world polity network, cooperation may not be their only reason. Nations and organizations may also pursue other agendas when they participate in the world polity network. It is possible that multiple levels of power issues are involved and play important roles.

Second, important concepts such as world culture and world models are not clearly defined and insufficiently studied. Although some studies have been conducted to examine world models through INGOs' structures and operations, they still do not provide a clear and comprehensive picture of world culture and models.

Third, as noted by Beckfeld (2003), the study of the effect of world culture has overshadowed the research into the structure and shape of the world polity network. A clear understanding of the communication structure of the world polity network may hold important implications for our understanding of whose voice will dominate the world culture, and whose interests will be served best in the globalization process.

Finally, the concept of world culture may also suggest a lot of conflicts (Meyer, Boli, Thomas, & Ramirez, 1997). This is because when actors are influenced by similar models and purposes, they tend to compete for similar resources for development. Such competitions may suggest an increase in world conflict rather than cooperation. Further, the idea of creating a homogeneous world may activate great resistance. For example, while globalization is welcomed in many countries, anti-globalization movements are

also very active. With the help of new media, anti-globalization activists organized large scale protests to protest World Trade Organization (WTO) Ministerial Meeting in Seattle in late 1999 (Kahn & Kellner, 2004). Terrorism is also a form of resistance against world culture (Castells, 1996). These theoretical issues need to be considered by future researchers.

Implication for the structure of global civil society's virtual network. WPT has suggested that NGOs are carriers of world culture. The purpose of their communication is to institutionalize nations and societies based on their worldview, culture, missions and values (Meyer, Boli, Thomas, & Ramirez, 1997). They form transnational networks to accomplish their missions. These networks are greatly facilitated by modern communication technology and global mobility (migration, tourism, etc.). Such networks are increasingly thickening and widening and will exert considerable influence on human society. Following WPT, the structure of global civil society should present a relatively flat structure. The interactions among international civil actors are inclusive and fair (Meyer, Boli, Thomas, & Ramirez, 1997). In other words, civil actors equally communicate in the global public sphere to advance their cause (Kahn & Kellner, 2004). In this process, world models and values that cannot withstand scrutiny will be discredited and models that have legitimacy will be disseminated within the world polity network.

WPT assumes that culture also significantly influence the structure of global communication. The diffusion process of world culture may be affected by local culture and values. Some local cultures may be especially receptive to world polity models. Studies found that cultural factors such as language and religion are significant

predictors of international communication structure (Barnett, 1999, 2001, 2002; Barnett & Choi, 1995). Barnett and Sung (2005) found that culture is a powerful predictor of the structure of the international hyperlink network. Beckfield (2003) found that world system position and civilizations types (measured by major religion systems) affect the network structure of global civil society. Chilton (1995) found that common languages, symbolic references and larger political context that affected all countries of Eastern Europe served to increase transnational coalition among civil actors in these countries. Therefore, the following research question 5 is proposed:

RQ5: What is the relationship between an INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the civilization type of the organization's country-of-origin?

Further, as has been reported in previous studies, culture types may affect the component structure of international virtual communication (Barnett, 1999, 2001, 2002; Barnett & Choi, 1995). In other words, organizations share similar cultural backgrounds may be more likely to cluster together. Hence, hypothesis 4 was proposed:

H4: The component structure of the INGOs' network is significantly influenced by the civilization types of INGOs' countries-of-origin.

WPT argues that the density level of world polity ties (such as the number of INGOs a country involves with) affect the effective level of INGOs. In other words, INGOs from countries with dense world polity ties may be more powerful and central in the global civil network. To investigate the relationship between the numbers of world

polity ties of INGOs' countries-of-origin and those INGOs' virtual network positions, research question 6 was proposed:

RQ6: What is the relationship between an INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the world polity ties of the organization's country-of-origin?

WPT suggests that in countries that have dense world polity ties, NGOs would have greater social impact. This is because a country's participation in international organizations is considered as an indicator of its adoption of a wider system of values, beliefs and organizing principles. The number of visitors or followers of an NGO's website or social media account is an indicator of the NGO's social impact. Further, the more visitors a NGOs' virtual communication forum has, the more likely it is that this forum can provide opportunities for different actors to develop social ties. Therefore, the following hypotheses can be proposed:

H5a: The websites of INGOs originated from countries with dense world polity ties have more visitors than websites of INGOs originated from countries with sparse world polity ties.

H5b: Facebook accounts of INGOs originated from countries with dense world polity ties have more followers than Facebook accounts of INGOs originated from countries with sparse world polity ties.

The rational institutional and world society approaches predict that the global civil society has a relatively flat structure. The structure of the global civil society may be influenced by culture and language. Further, in a country that has more ties linking

with global civil society, there may be more visitors or followers of NGOs' websites and social media. Overall, WPT predicts a model of global civil actors' virtual connections that emphasizes the importance of linkages with global civil society.

The Network Society

Dijk (2006) argues that the 21st century should be called "the age of networks" (p. 2). Castells' discussion of network society is based on three important observations: globalization, technological innovation and the existence of global networks wired with a capitalist logic. Globalization is accelerated by the dominance of a world capitalist economic system. The combination of globalization and the proliferation of the Internet and other information technologies have simultaneously created a new situation for humankind that is unprecedented in history. The trend has manifested itself in numerous forms. Trade, politics and societies are all subject to its impact. In the network society, individuals are part of the network, so are organizations and nations.

Communication technologies and the network society. Castells (2001) argues that "if information technology is the present-day equivalent of electricity in the industrial era, in our age the Internet could be likened to both the electrical grid and the electric engine because of its ability to distribute the power of information throughout the entire realm of human activity. Furthermore, as new technologies of energy generation and distribution made possible the factory and the large corporation as the organizational foundations of industrial society, the Internet is the organizational basis for the organizational form of the Information Age: the network" (p. 2). In a network society, boundaries are still meaningful, but many times can be overcome via facilities provided by information technologies. The building of influential networks has not been

limited to economic, professional or political considerations, people now often build networks based on interests, hobbies, initiatives, desires or shared experience.

Information technology is central to Castells' discussion. Castells (1999) notes that his understanding of technology is similar to Claude Fischer's (1992) description of the relationship between society and technology. Fischer (1992) proposed a social constructivism approach to examine the relationship between technology and society. According to this approach, technology does not predestine the future of an innovation. The negotiation among interested parties, such as the inventor, users, competitors, government, etc., shapes the path of technology. This perspective brings users into the analysis, and suggests that the effect of technology is the ends that users seek. Because users can have multiple ends, and those ends may change over time, the future of a new technology is unclear. In other words, the industry cannot decide the fate of a product. The acceptance of a new technology depends on things such as needs, tastes, availability, affordability, and other considerations. The inner logic of a technology also cannot set the use of the technology because individuals enjoy initiatives in determining how they would use a certain technology. Although technology development is often startling, their social influences may be relatively modest or lag behind. This is because great social innovations may not happen when a new technology is introduced into the society. Social innovations or important transitions happen when social behavior patterns change. For social behavior patterns to change, a technology needs to fit the overall needs of the society and at the same time attract enough users. Sometimes, social behavior patterns, especially those fundamental patterns are resistant to changes.

Castells views technology as a socially embedded material culture. Although technology alone is not the cause of significant social changes, it is an indispensable means for the manifestation of current social changes. Technology allows new forms of social organizations and interactions. As defined by Castells (2009), “a network society is a society whose social structure is made around networks activated by microelectronics-based, digitally processed information and communication technology” (p.24). Such technological infrastructure was mostly produced within recent decades. For example, five generations of computers, the invention of the integrated semiconductor, development of portable audiovisual equipment, digitalization technology, optical fiber, communication satellites, and other technological advancements have provided the capacity for humans to transfer massive amounts of data over long distance and within a very short time period. The digital based infrastructure of the network society can facilitate meaningful communication to transcend territorial and institutional boundaries. Therefore, it allows the expanding of networks to cover the entire globe. For instance, technological advancements have made the multi-layered, multinational corporations profitable. For corporations, their manufacture, storage, shipment and sale now can take place in many different countries and areas without large transaction fees and communication costs (Shirky, 2009).

According to Castells (2008): “new information and communication technologies, including rapid long-distance transportation and computer networks, allow global networks to selectively connect anyone and anything throughout the world” (p. 81). To Castells, being a part of globalization means being a part of a large network. The key element of this argument is that core economic, communicative, and cultural

activities are globalized and networked. Not everyone on earth is globalized, but the global network affects everyone. The comparative value of individuals, organizations and nation states depends on if they can be included in this network. The global network connects and disconnects at the same time. The network strives to incorporate everything that is valuable while at the same time it bypasses and excludes everything that does not add new value to the network or is deemed as disruptive to the network. What is valuable in the network is not static definitions, but constantly “programmed” in the network (Castells, 2008, p. 81).

Network society assumes that actors are connected through networks and their behaviors are largely influenced by their network positions. The next section will present major actors in network society.

Actors in network society. *Nation-states.* In the network society, the sovereignty and responsibility of network states are shared by other states and organizations (Castells, 2008). Governments, as with any other organization, institution or individual in society, are networked and dependent on other actors. At the international level, governments are members of governmental organizations and treaties, and rely on the authorities of this international polity to advance their interests. Nation-states increasingly form dense networks of international institutions, supranational organizations, and networks of states to deal with global issues. Examples include the United Nations (UN), North American Free Trade Agreement (NAFTA), Asia-Pacific Economic Cooperation (APEC), International Monetary Fund (IMF) and European Security Conference (ESC). Further, some nation states actively cooperate with NGOs’ networks. At the domestic level, governments are subject to pressure from

business and interests groups, and their power is sometimes challenged by social movements. Governance is more flexible with the facilitation provided by networks but is also constrained by interdependency. Further, the legitimacy of many governments no longer solely depends on their internal factors but also on other actors. Countries actively engaging in international image building may use this strategy to fortify their international influence and expand recognition in international discourse. International image building also helps countries to gain trust and approval among their own people.

Castells' (1996, 2009) description of social structures clearly follows neo-Marxist assumptions. According to Castells, the current social structure is formed by the interactions among relationships of production, consumption, reproduction and power. Networks are relationships and organizations embedded in the social structure and perform functions to maintain the current structure. Since the essential characteristics of networks are defined by capitalism's production relationships, the global network society is a capitalist society.

Castells (2002) conceptualizes social processes and institutions as "expressions of networks" (p.696). This structure is vastly different from a center or hierarchical social structure as described in World System Theory. Castells (1999) defines network architecture as "...dynamic, open-ended, flexible, potentially able to expand endlessly, without rupture, bypassing/disconnecting undesirable components following instructions of the networks' dominant nodes" (p. 409). This type of network has an issue-centered structure. Nodes are connected through a common goal or a shared interest.

Power in network society. As defined by Castells (2009): “power is the relational capacity to impose an actor’s will over another actor’s will on the basis of the structural capacity of domination embedded in the institutions of society” (p.44). Castells (1997) argues that “globalization and informationalization, enacted by networks of wealth, technology, and power, are transforming our world” (p.68). Power is a key component of Castells’ discussion of network society.

In a network society, although the traditional power forms such as monetary power, political power, military power, ideological power are still dominant, all of these power forms are structured around network power. In a network society, power is generated from three sources: 1) an actor’s ability to organize the network; 2) an actor’s ability to define the goals and norms of a network; and 3) an actor’s ability to connect separated networks (bridging power as discussed by Burt’s (1992) structural hole theory). To resist network power, actors need to create new networks, change the dominant goal of a network, or replace controllers of the connections between strategically important networks.

In a network society, the magnitude of power depends on two conditions (Castells, 2009). First, the extent to which multiple individuals and groups are involved in certain networks. In other words, the larger the quantity of connected actors, the more powerful a certain network is. Further, the diversity of involved actors is also an important consideration. Castells (2008) notes: “the exercise of power in the network society requires a complex set of joint action that goes beyond alliances to become a new form of subject” (p.45). Second, the level to which networked actors share common goals or interests. Unconscious networks, or networks that merely exist

without specific goals or purposes may possess limited power. Rather, individuals, organizations and countries that organize around certain interests or projects may exert larger power.

For an actor to be able to define the goals and norms of a network, the actor needs to communicate with other actors and advocate its ideology, agenda and values in the network. This is a fundamental power in the network society. Castells (2009) argues: “this capacity ultimately depends on the ability to generate, diffuse, and affect the discourses that frame human action” (p.53). In other words, actors that have more communication power in a network may enjoy larger influence over this network. Besides communication, controlling the connecting points of networks can also bring an actor power. Further, the control of strategically important networks will bring more power than less important networks.

Culture in network society. Culture can be understood as the set of values, beliefs, norms and practices that inform, guide. Culture motivates people’s behaviors and shapes people’s worldview. Culture exists in the constant process of communication (Hill & Hughes, 1998). The emerging of global network society does not deny the existence of local culture and local practice. Not everyone equally participates in the global network. Local culture and practice will still constitute the major part of most people’s daily life (Schuler & Day, 2004). However, with the expansion of the global network, no country or area can escape the influence. Their major economic, political, and scientific activities are subject to and involved in the global network.

The formation of what Hall (1990) called the “global postmodern culture” (p.29) is now happening across the globe. The idea of simultaneously global and local is based on a new interpretation of space and time, which further suggests a culture fusion phenomenon. Local cultures still exist and are distinct, but not in an isolated, or “pure” sense. In the network society, the discussion of local culture is inevitably based on the background of global culture, regardless whether or not the discussants acknowledge this fact. This is because the interpretation of meaning largely depends on the context of social relationships in which information is communicated. In the network society, the inter-connection of complicated networks often simultaneously offers different interpretations. The connectivity gradually rules out singularity. Castells (2009) notes that the feature of communication in our age is “the articulation of all forms of communication into a composite, interactive, digital hypertext that includes, mixes, and recombines in their diversity the whole range of cultural expressions conveyed by human interaction” (p.55).

The boundary between local and transnational will increasingly blur, meaning that what is local at one place, may also become both exotic and local at other places. Culture is a product of human life and also provides symbolic guidelines for human practice. It has always been subject to constant change. In the thousands of years of human history, due to relative isolation among regions, the redefinition and change of culture might be a slow process. However, in the network society, with ideas, norms and trends constantly flowing across the globe, the change in culture may be accelerated. This social structure allows the prominence of some ideologies such as consumerism in many countries; it also provides a favorable social environment for transnational NGOs

to advocate new values, models and practices in many different nation states and be accepted by vastly different locals. Local culture is not just a passive object of the global network. Rather, at every different place, the global network is impacted by local characteristics and shaped by local culture. Further, the global network can disseminate local features to the overall network, given the efforts of certain interests or strategies.

Implication for the structure of global civil society's virtual network.

According to Castells (2004), the current social networks enabled by advanced information technology have the following characteristics: 1) flexibility: networks are adaptive to the changing environment, and are capable of keeping goals while changing components; 2) scalability: networks can expand or shrink with relatively low cost, and allows grassroots networks to expand and connect with other networks; 3) survivability: networks can reproduce center or nodes and find new ways to function.

Therefore, following the logic of Castells' discussion, the structure of global civil society has a relatively de-centered structure. Global civil society is operated under flexible rules, and its structure facilitates coordination. Further, "the relative importance of nodes does not stem from their specific features, but from its ability to contribute valuable information to the network" (Castells, 2000, p.16). The value of nodes is not internally decided, but depends on the logic of the network. Networks in networked society are especially capable of organizing around flexible issues or events. In other words, INGOs' issue areas can be understand as "expressions of networks" (Castells (2002, p.696). The importance of issue areas lays in the fact that according to Castells (2002), issue areas provide common grounds for individuals and organizations to collaborate and exchange information and resources. In the virtual space, actors are

relatively less limited by geographic boundaries. Issue areas emerge as important factors that influence actors' behaviors. Therefore, the following research question and hypothesis can be proposed:

RQ7: What is the relationship between an INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the INGO's issue area?

H6: The component structure of environmental INGOs' virtual network is significantly influenced by INGOs' issue areas.

In addition, the following research questions were proposed to guide the analysis of the relationship between an INGO's issue area and its number of website visitors and Facebook followers.

RQ8: What is the relationship between an INGO's number of website visitors and its issue areas?

RQ9: What is the relationship between an INGO's number of Facebook Followers and each INGO's issue area?

Further, Castells (1996, 2008) argues that the nature of networks also affects actors' performance. One of phenomena that widely exist in large scale networks is power law distribution, which suggests the time when an actor joins a network would significantly influence the actor's network position. Actors that enjoy a network early tend to attract more attentions. The more attentions an actor gets, the more followers this actor can continue to draw. This "winner takes all" effect eventually helps some actors develop into disproportionately important nodes in their networks. Seniority is not the only factors that influence if an actor stays at the top of a power law distribution,

but it is one of the most important factors (Barabasi, 2002, other factors including the performance of the actor, quality of its work, etc.). In this project, seniority is also relatively easy to find an empirical indicator to measure: INGOs' years of operation. Therefore, the following research question was proposed to examine the relationship between an INGO's years of operation and its network position.

RQ10: What is the relationship between an environmental INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the INGO's years of operation?

RQ11: What is the relationship between the component structure of the environmental INGOs' online communication network and INGO's years of operating?

Issue area is an important organizing force according to Castell (1996)'s discussion of collective identity. Identification with a group is a critical component of collective action (Smith, 2002). Groups that lack shared physical or other characteristics as defined by race, gender or religion must find other common values upon which to base their collective identities and organize collective actions. For instance, environmentalists can identify with the universal value of environmental protection and form transnational organizations.

Notably, the structure of the global civil society as predicted through network society theory is the opposite of the structure derived from the World System Theory. The network society suggests a de-centralized global civil society in which the prominent level of nodes is not determined by the country-of-origin of nodes. The network society perspective outlines a shift in social structures away from a state-

centered structure. In contrast, the World System Theory predicts a hierarchical structure in which the connection among civil actors may feature a three-tiered structure. These two structures imply different social functions of global civil society. The network society structure suggests an interest-driven function. In other words, networks of global civil society are formed around issue areas, and function to solve certain issues. In contrast, the world system theory conceptualizes global civil actors as agents of nation-states. The network model based on the network society perspective is also different from the model based on World Polity Theory. The model based on WPT predicts a relatively flat structure of the civil society. The model based on the Network Society perspective emphasizes the clustering structure of different civil actors.

The availability of technology, especially information technology such as the Internet, is essential to the maintenance of the network structure. This discussion can also be tied to the long-standing discussion about the digital and economic divides existing among countries (Norris, 2001). Global civil actors that have better access to the Internet and relatively abundant experiences with operating online forums may possess better capacities to communicate in the virtual world. Civil actors originating from countries where access to the Internet is more accessible therefore have advantages when compared with their counterparts originating from countries with limited access to the Internet. For example, the International Telecommunication Union in 2008 estimated that in every one hundred residents in Cambodia (one of the countries with lowest Internet penetration rates), there are 0.51 Internet users. In the same year, in the U.S. (one of the countries with highest Internet penetration rates), among every one hundred resident, there are 75.12 of them have access to the Internet. The difference

between the two countries is 147.29 times. It can be assumed that civil actors in Cambodia would have far less experience with using and maintaining online forums than civil actors in the U.S.

Castells (2009) argues that in a network society, the magnitude of power depends on two conditions: 1) the extent to which multiple individuals and groups are involved in certain networks; and 2) the level to which networked actors share common goals or interests. By connecting with more nodes, a node can enhance its importance level and become less likely to be excluded from the network. Further, the network society perspective assumes that the structural logic of the contemporary era is based on networks, and more specifically, communication technologies enabled networks that span across the globe. Therefore, the following hypotheses were proposed:

H7a: INGOs' virtual network centrality as measured by indegree centrality is significantly predicted by the Internet connectivity of environmental INGOs' countries-of-origin.

H7b: INGOs' virtual network centrality as measured by outdegree centrality is significantly predicted by the Internet connectivity of environmental INGOs' countries-of-origin.

H7c: INGOs' virtual network centrality as measured by (incoming tie) closeness centrality is significantly predicted by the Internet connectivity of environmental INGOs' countries-of-origin.

H7d: INGOs' virtual network centrality as measured by (outgoing tie) closeness centrality is significantly predicted by the Internet connectivity of environmental INGOs' countries-of-origin.

H7e: INGOs' virtual network centrality as measured by betweenness centrality is significantly predicted by the Internet connectivity of environmental INGOs' countries-of-origin.

Further, the following research questions were proposed to guide the analysis of the relationship between the Internet availability of an INGO's country-of-origin and its number of website visitors and Facebook followers.

RQ12: What is the relationship between the Internet connectivity of an INGO's country-of-origin and the INGO's number of website visitors?

RQ13: What is the relationship between the Internet connectivity of an INGO's country-of-origin and the INGO's number of Facebook followers?

The discussion of network society emphasizes the importance of networks and communication among networked actors. The role of information and communication technology is also emphasized in this perspective.

In sum, this chapter reviewed three competing theories that have been applied to examine the structure of global civil society. Specifically, World System Theory emphasizes the influence of economic force and a hierarchical structure in international relationships. A set of research questions and hypotheses were proposed to test the effect of these variables. World Polity Theory highlights the impact of culture and world polity ties. This institutional approach implies that culture and world polity ties may affect civil actors' virtual structure. A set of research questions and hypotheses were proposed to test the effect of culture and world polity ties. Finally, the discussion of network society shed lights on our understanding of the logic of networks. This study found issues area and years of operation as two proximate indicators to measure the

influence of network logics. Most of these measures directed attention to structural aspects of global civil society. Structural features of systems can be effectively described and examined by using social network analysis (Monge & Contractor, 2003). In the following chapter, the social network perspective and methods of social network analysis are presented.

Chapter 3: The Social Network Perspective

In the modern world, as globalization becomes pervasive, people increasingly realize that most events and phenomena are connected and affected by a huge number of complex systems. The rapidly developing science of networks is revealing exciting phenomena that may potentially change our view of society and nature. The increasing importance of the Internet in our daily communication and work also adds to the influence of networks in our everyday life (Castells, 2009). For example, traditional sociology conceptualized countries' level of democracy as determined by individual country' socioeconomic attributes such as GNP, education, urbanization and industrialization. However, recent studies have shown that relationships such as the structure of countries' network, the situation of countries' neighborhood networks (Gleditsch & Ward, 2006), and a country's membership in international economic and political networks (Wejnert, 2005), can strongly predict a country's level of democracy.

The social network perspective attends to the patterns of relations among actors, monitors flow of resources (e.g., information, investments, etc.), and reveals how structural factors constrain or foster the activities of networked actors (Wasserman & Faust, 1994). As Barabasi (2002) notes: "they open up a novel perspective on the interconnected world around us, indicating that networks will dominate the new century to a much greater degree than most people are yet ready to acknowledge" (p.7). The social network perspective is an important theoretical perspective underlying the three compelling theories, World System Theory, World Polity Theory and Network Society. In the next section, a brief history of the social network perspective is introduced.

The Development of Network Research and Theories

In this section, the development of network research and theories is reviewed. Key concepts and major findings are introduced. The discussion is followed by an introduction of social network analysis.

Networks have been studied for centuries. Networks have many different formats. There are natural networks such as neural networks. Networks can also be manmade, such as inter-organizational networks and the whole Internet. Swiss mathematician Leonhard Euler is a pioneer in using graphs to solve problems concerning bridges and land masses (Barabasi, 2002).

Systems theories are important foundations of social network theories. System theories that are based on biological and mathematical perspectives explained networks from different points of view. Biologically based systems theory conceptualizes organizations and societies as organisms striving to adapt to the environment in order to survive. Networks are relatively open and adaptive systems formed by at least three organizations, or nodes in network theory terms. According to Dijk (2006), networks can maintain and support the interaction among units of a system or between systems. Frequent interaction could cause variation in the system, which cause change and adjustment. Through these procedures, systems can perform a selection of successful actions or actors. The aforementioned processes are constantly ongoing. The beginning of a new one follows the completion of one selection procedure. The overall outcome is the survival of certain units or systems, or the overall progress of a society.

System theories that are based on mathematical foundations conceptualized systems as units, and are constituted by inter-connective elements or isolated elements.

The random network theory that was founded by Erdo and Renyi dominated scientific communities for decades (Barabasi, 2002). This theory views all complex systems as governed by randomness. Changes are emerged through natural processes that “produce order out of chaos” (p.31). This assumption suggests that links are formed independently, and the structure of links around some nodes can be explained by chance alone.

Disciplines of social and behavioral science that follow the mathematical tradition applied and developed early social network approaches in three major areas: small group study; research of interpersonal relationship and the formation of cliques; and anthropology research on the structure of community in tribes and villages (Scott, 2000). The early scholarship of social network analysis generated significant findings for individual disciplines, and also set up an increasingly consistent and coherent foundation for further development.

In the late 1960s and 1970s, the applicability of Erdo and Renyi’s random network to social networks was questioned by scientific breakthroughs. White, Boorman, and Breiger (1976) Boorman and White’s (1976) papers laid important intellectual and methodological groundwork for the application of SNA to social science research. Milgram (1967), for example, discovered that for a resident in any given country, it only takes him or her no more than six acquaintances to know any other resident of the same country. This is the famous *small world* phenomenon (also known as the *Six Degrees of Separation*). The phenomenon is caused by the fact that people tend to live as clusters. Among clusters, there always are weak ties that can bridge one cluster to another. Therefore, people can be easily linked to one another even

without their own awareness of such relationships. Advanced technology and new media, social network websites, for example, greatly increased the number of weak ties. Therefore, clusters of people were easier to link or mobilize for certain calls. This mechanism may help to explain how new media facilitates social movements and activism (Barabasi, 2002).

The small world phenomenon introduces a highly interconnected world. Erdo and Renyi suggest the social system is a random network. If the social system is completely random, then the distance between any two nodes should be roughly equal. As the number of nodes increase, the distances among nodes should also increase. However, unlike the system predicted by Erdo and Renyi, the *small world* phenomenon suggests that nodes are connected by key fabric structure of our society and the distance between any two given nodes are smaller than would have been suggested by a random system. When applying the theory of the *Small world* phenomenon to online networks, Barabasi (2002) and his colleagues found that the average distance for two random Web pages/documents is about nineteen degrees of separation. This finding suggests that the *small world* phenomenon also presents in the virtual world. Small degrees of separation are also commonly found in many other types of social networks. For example, scientific communities are often found to demonstrate the small world phenomenon. In scientific communities, researchers tend to cluster together while separate clusters are linked by a few ties (Newman, 2001).

Granovetter (1973) also found that members of society tend to form small clusters, and such clusters are connected to each other by a few weak ties among nodes belonging to different clusters. In a random network, nodes exist independently and

form links with other nodes randomly; therefore no cluster should exist. The ties that link different clusters together are connectors. Connectors typically have a large number of links and are a fundamental property of many types of networks. Connectors are also known as hubs.

Cyberspace has been lauded for introducing the ultimate forum for democracy (Biddix & Park, 2008; Uslaner, 2004). According to this view, the cyberspace is the realm where everyone potentially has an equal right to speak up (Dimmick et al., 2007). Nevertheless, if we consider the possibility of a random message being noticed online, then the Internet is a space where democracy is almost completely absent (Barabasi, 2002). Given the amount of information stored online and the limited attention everyone has, the chance for a random message to be heard or noticed is infinitely close to zero. Using incoming links as an index for visibility, most web pages have a small amount of incoming links. Hubs, Google, Yahoo! for example, in contrast, tend to have millions of incoming links and therefore are extremely visible. Barabasi (2002) notes that “hubs are the strongest argument against the utopian vision of an egalitarian cyberspace” (p.58). In cyberspace, hubs also function to link separated clusters. Hubs deserve special attention because they dominate the structure of networks in which they present. Further, in terms of the distribution of an innovation or the spread of an epidemic, hubs also make significant differences. A series of important questions such as how hubs come to exist or how many of them normally appear in a given network have implications for our understanding of the essential characteristics of networks.

Another important finding of complex networks that is closely associated with hubs is power law distribution (Barabasi & Albert, 1999). Power-law distribution is

based on the possibility of tie distribution in self-regulating and interactive systems. Power law distribution can be expressed by the equation: $N(k) \sim k^{-\gamma}$, where γ is the degree exponent (Barabasi & Albert, 1999). Power law distribution describes such a distribution pattern that the n th position has $1/n$ th ranking. In such distribution, the difference between the first position and the second position is much larger than the difference between the second position and the third position. The higher a position is the more extreme its condition gets. In this type of distribution, mean, mode and median are vastly different. The majority of nodes in this distribution are far below the average. Further, as the population increases, the inequality among nodes will also increase. In other words, the distance between the highest and the lowest position will increase as more samples are collected.

This curious feature of power law has been applied to examine hyperlinks among websites, web blogs, and forums (Meraz, 2009). Studies repeatedly have found this mathematic phenomenon in different contexts. Power law distribution also helps to explain the existence of hubs. Power law predicts that each scale-free network may contain several hubs that could define the network's structural stability, dynamic behavior and other structural features. The presence of power law distribution in a network indicates the transition from chaos to order, and is the hallmark of self-organized complex system (Barabasi, 2002). The power law distribution also produces preferential attachment, which is formed based on a group choice pattern: the rich get richer.

In general, most self-organizing networks demonstrate growth and preferential attachment. Growth means that the number of nodes in a network increases over time.

Preferential attachment suggests that when new nodes join a network, they are more likely to link with nodes that already get a lot of links. The expansive nature of networks gives early nodes an advantage over latecomers since being in a network longer give a node more chances to connect with other nodes. Preferential attachment is essential to the formation of hubs. By attracting more and more nodes over time, a node can emerge as a hub. Therefore, power law can fully explain the existence of hubs.

However, the fact that early nodes enjoy certain advantages does not suggest that newcomers can never win out over early nodes. Barabasi (2002) notes that the rate at which incoming links of a given node increase is the product of the node's fitness and the number of links it already possesses. Fitness refers to a node's ability to attract links in a competitive environment. When links are finite resource, nodes tend to compete for more links since more links represent more survival chance or power. The competition in some systems is obvious while in others it may appear to be subtle. Over time, nodes that are the fittest tend to grow into the largest hubs.

The concepts of network expansion, competition, node fitness and hubs form a consistent argument. This argument suggests that the power law distribution that can explain the unique features of network hubs and their formation.

The research method that applies the social network perspective to studies of social relationships is social network analysis. The next section will introduce this method.

Social Network Analysis

The powerful influence of relationships is now emphasized across disciplines. Social network analysis (SNA, hereafter) "is a methodology for examining the structure

among actors, groups, and organizations that works to explain the variations in beliefs, behaviors, and outcomes” (Hatala, 2006, p.47). In other words, SNA is a set of related approaches, techniques and tools that can be used to describe or analyze relationships among actors (including individual, organizations and nation states) (Ackland, 2009).

SNA represents an attempt to rigorously study the structure of networks. Wellman (1982) notes that SNA provides the framework through which we can examine “how resources are gained or mobilized—such as exchange, dependency, competition and coalition—and the social systems that develop through these processes” (p. 91).

SNA supports multilevel analysis. At the micro-level, attention can be focused on ego-centered networks and examine a handful of actors and their connectedness. At the macro-level, researchers can investigate the emergent structures among network members. And researchers can also employ the hyper-networks perspective, which combines different networks in one analysis (Anheier & Katz, 2004).

In the mid 1930s, researchers began to utilize social network analysis in social science research (Carrington & Wasserman, 2005; Hatala, 2006). Attracting relatively meager attention at that time, social network analysis has come into the spotlight since the 1990s. Interest in SNA has increasingly grown in the new millennium (Carrington & Wasserman, 2005). Now, SNA has been broadly adopted by disciplines including sociology, social psychology, political science, anthropology, human resources, economics and communication (Katz, Lazer, Arrow, & Contractor, 2004).

Another reason for the increasing attention to social network analysis is because this methodology allows new answers and perspective for standard social and

behavioral science questions. Questions regarding structures of groups of individuals, organizations, and countries used to be viewed as given in social science, now can be investigated and defined precisely through social network analysis (Wasserman & Faust, 1994).

There are three major mathematic foundations of social network analysis: graph theory, statistical and probability theory and algebraic models. Graph theory provided appropriate visual representations of social networks, and concepts and notations that are widely adopted in current social network analysis. Graph theory is designed to find the order and potential link from seemingly chaotic elements of a system. In fact, order does exist in seemingly chaotic systems. Statistical theory is often applied to research inspired by balance theory, transitivity, behavior patterns of triple relationships, and prediction of tendencies toward reciprocation. The probability of the distribution of relationship also allows the development of complex social network analysis models, which now can model multivariate relational networks (Carrington, Scott, & Wasserman, 2005). Further, these models can show the error and goodness-of-fit (to a data set) of proposed models based on theories. Algebraic models are especially applied to multi-relational networks. Multi-relational networks are networks of combinations of relationships. In this type of matrix, multiple relationships can be simultaneously modeled. This is closer to reality because in real life, relationship between people can be complicated. For example, A can be friends with B. At the same time, A is friends with C, who is an enemy of B. These models have been applied to study role structures of individuals, organizations and countries.

In the field of communication, SNA has been widely used to examine the information flows among individuals, organizations and global organizations, social support and behavior change, and the effect of the Internet on personal social capital (Monge & Contractor, 1997).

Adopting SNA is meaningful for communication research. This is because SNA is unlike analysis in most other behavioral sciences, which based on attribute data such as attitudes, opinion or behaviors. SNA, on the other hand, mainly collects relational data like “contacts, ties, connections” (Scott, 2000, p.3). Therefore, SNA is helpful for revealing the patterns of communication among members of a given social structure, and offers a structured way of conceptualizing and measuring external ties and their impact (Carrington & Wasserman, 2005). Further, SNA offers an array of methodological tools for investigating connections between a group and its external context. Today, with new computer technology and software, researchers can easily analyze network data (Scott, 2000).

Basic Concepts of Social Network Analysis

Components of a network are nodes, and “a network is a set of interconnected nodes” (Castells, 2009, p.19). The important level of a node in a network does not exclusively depend on the attributions of the node, but also, and arguably, to a large extend, depends on the network position of the node. To emphasize networks is to emphasize relationship instead of attributes (Castells, 2009). This emphasis leads to the practice that in SNA, nodes are often not sampled independently as in many other kinds of quantitative studies (Aldrich, 1982; Borgatti & Everett, 1999). SNA predisposes the researcher to examine how individuals are embedded within a network and how the

network emerges from the micro-relations between nodes. This quality of SNA allows researchers to more rigorously think and understand multiple levels of relationships.

Nodes of a network are linked to one another by social ties (Borgatti & Everett, 1999). Social ties can take many forms. For example, one person's evaluation of another person, one organization's cooperation with another on one type of projects, association or affiliation, and biological relationships are ties that can potentially link at least two nodes together. Two nodes and the tie between them constitute a dyad. A dyad can be the unit of analysis of dyadic relationship analysis. When there are three nodes and their ties, they form a triad. Triads are the unit of analysis of many important social network analysis studies such as transparency between nodes, structural holes and balance theory (Burt, 1992).

Ties reflect social relationships (Dijk, 2006). A relation has three dimensions of meanings: content, direction and strength. A relational content refers to the resources that are flowing or exchanged in networks. A relation can be directed or undirected, depending on the research context. Relations also differ in strength (Freeman, 1979). Relationship strength can be operationalized in many different ways, such as the frequency of communication, the number of exchanges, the amount of investments, etc. The conceptualization of ties assumes that those social relationships are real and meaningful determinants of patterns of interactions. In SNA, researchers rarely sample, but select relationships that are relevant to research purposes.

When collect tie data, a research can either employ the "full network" method design, in which all connections among members within a network are collected. Or, the

researcher can apply the “snowball” method to data collection, in which data collection begins with a focal actor or a set of actors, and collect other actors linking to focal actors.

When coding relational data, one method is to code binary measures of relations by coding the simple presence/absent of ties. Another method is to code multiple-categories of relations. Relationships can also be measured by rank-order such as best friend, second best friend, etc. The most advanced level of measurement for relationships is the interval level data which assumes the distance on a scale reflects the same amount of real difference.

Network position is another important concept in social network analysis. Burt (1976) defines network position as: “the specified set of relations to and from each actor in a system” (p.93). In each network, two or more actors may share the same network position. Anheier and Katz (2004) summarized five types of network positions that are especially important: cohesion, equivalence, prominence, range and brokerage. Cohesion looks at the tendency of networked actors to form cliques; equivalence emphasizes the extent to which members of a network have similar relations with other actors; prominence refers to positions in networks that originate from actors’ connections with other less or equally prominent contacts; range refers to a bridging phenomenon between two otherwise disconnected networks; and brokerage refers to a network position in which an actor bridge the structural hole between two actors.

As noted by Grewal (2008): “It is important to distinguish between the abstract methodology of social network analysis and the empirical study of social networks” (p.185). The translation from rich empirical social network phenomenon into abstract

mathematical measurements requires operationalization of the variables. This process may result in the loss of meaning. Further, the translation of the insights gained from social network analysis back to the real world requires proper interpretation. The interpretation may be subject to bias or misreading of analytic results. To meaningfully advance knowledge, social network analysis should be guided with proper theoretical or conceptual strategy. Without proper social network theories, social network analysis may be reduced to graphic description of social relationships without deep insights of their structural function. Methodological advance alone is not sufficient to generate findings that have predictive power or theoretical significance.

Hyperlink Network Analysis

Hyperlink analysis combines social network analysis and data mining technology to investigate the structure of virtual communication among social actors (Park & Thelwall, 2003). When compared with other online research that concentrates on the interactions between humans and computers, HNA focuses on the interplay among web sites or the relationships among sub-networks (Weare & Lin, 2000). Therefore, HNA allows researchers to trace how information flows through direct and indirect virtual networks, and how web sites form coalitions or cliques (Garton et al., 1997).

In recent years, there has been an increasing interest in the study of hyperlink networks (Bae & Choi, 2000; Elmer, 2006; Jackson, 1997; Park & Thelwall, 2003; Shumate & Lipp, 2008). HNA has been applied to topics such as the structure of international hyperlinks and information flows (Barnett & Sung, 2005; Chang et al., 2009), networks of e-commercial web sites (Palmer et al., 2000), virtual health

communication (Shumate, 2008), interpersonal online communication (Adamic & Adar, 2001), and virtual inter-organizational communication (Bae & Choi, 2000; Shumate & Dewitt, 2008). Studies have found that HNA provides a robust quantitative approach to study the web network structure.

The rationale of HNA research is that hyperlink networks reflect relationships among individuals, organizations or governments who own and design these websites. The linkages among web sites can be understood as social ties. Although website owners have considerable freedom in choosing the hyperlinks on their web sites, studies have found that most hyperlink structures are not products of random selections. Rather, “hyperlink structures are likely to be designed, sustained, or modified by web site creators to reflect their communicative choices and agendas” (Park & Thelwall, 2003, p. 5). Research has found that the hyperlink structure of an individual or an organization’s web site could demonstrate the individual/organization’s choices of alliances (Shumate & Lipp, 2008). For example, Park and Thelwall (2006) conducted a hyperlink network analysis of politicians’ web sites in South Korea, and found that political affiliation and interpersonal (friendships between politicians) factors significantly affect the political hyperlink networks. Further, studies have found that different organizational web sites possess different positions in a hyperlink network. For example, Park et al. (2002) found that among online commercial web sites, financial companies often play an important role in hyperlink networks. In short, findings from previous studies suggest that hyperlink networks are important indications of social relations.

NGOs tend to engage in certain issues or advocate for certain social movements (Garrido & Halavais, 2003). To serve these purposes, NGOs’ hyperlink networks have

unique features. Research suggests that NGOs working on similar issue areas tend to cluster together and use their virtual network to represent their alliance. Bae and Choi (2000) studied the hyperlinks among 402 human rights organizations and found that most organizations link to others with similar goals and activities. Shumate and Dewitt (2008) found that geographic factors significantly influence NGOs' associations in the virtual context. Shumate and Lipp (2008) found that NGOs' goals and mission also play a key role in influencing NGOs' virtual connections.

This project aims at testing research questions and hypotheses derived from World System Theory, World Polity Theory and the current discussion of Network Society. To address these questions and to examine the virtual network structure of the global civil society, social network theories and hyperlink network analysis provide powerful theoretical and methodological guidelines and tools. The next chapter discusses study design and methodological procedures in detail.

Chapter 4: Methods

Although numerous studies have examined the social implications of global civil actors, little research has been done to systematically collect information about how these organizations develop virtual networks that support transnational collective actions (Smith, 2002). This dissertation conceptualized the global civil society as a transnational system of social networks, a collection of international civil actors and communication among them. Further, this project examined the virtual network structure of global civil actors. The structure of the virtual global civil society can be examined through network analysis. Network analysis helps to identify social structures in social systems based on the relations among the components of systems (Barnett, 2001). Network analysis allows researchers to precisely map the relationships among states, organizations and individuals. Finally, network analysis is not limited by geographic or political boundaries, and it is a very effective tool for examining transnational phenomena such as global civil society (Hanneman & Riddle, 2001).

This dissertation described the relationships among a group of international civil actors with the most current data available. Attention was directed to the inter-organizational links among INGOs. Although INGOs are not the only types of global civil actors, and to focus on INGOs might leave out the important aspect of transnational inter-personal communication, INGOs are the most visible and central actors of the global civil society (Katz, 2006). Further, focusing on INGOs could offer the study a manageable research framework. Further, ties among formal organizations tend to be more stable than ties among individuals. The study of inter-organizational

ties allows the project to examine the relatively stable structure of global civil society (Monge & Contractor, 2003).

In this dissertation, given the scope of the global civil society, instead of studying all kinds of global civil actors, the attention was focused on the environmental protection sector. As discussed in Chapter 1, environmental INGOs are one of the most active international civil actors and their activity patterns are representative of the global civil society (Castells, 1997; Newell, 2001; Warkentin, 2001). Information about environmental INGOs (INGOs have membership from more than one country and focus on environmental protection related issues) can be obtained from the *Yearbook of International Organizations*. Since 1910, the Union of International Association (UIA) has been publishing information of all active INGOs and IGOs in the world. Currently, this dataset covers information of over 60,000 INGOs and IGOs (2008/2009, UIA). Among the 60,000 organizations, 509 are INGOs focusing on environmental issues. These 509 environmental INGOs are the subjects of the current study.

Research Question, Hypotheses and Data Analytic Procedure

In this section, to refresh the readers' memory, the research questions and hypotheses proposed in previous chapters were listed in Table 1, followed by explanations of how these questions and hypotheses were tested.

Insert Table 1 about Here

RQ1 was designed to explore to what extent INGOs have adopted websites and social media. To answer research question 1, the basic descriptive statistics of whether an INGO has an organizational website, a Facebook account and other types of social media were assessed using the Google search engine. The percentages of INGOs that

had functional websites, Facebook accounts and multiple social media accounts were reported. Basic patterns such as whether INGOs from developed countries were more likely to have websites, Facebook accounts and multiple social media accounts were examined.

Hypothesis 1 directed attention to the overall structural pattern of the environmental INGOs' virtual network. To test if there was a core-peripheral structure in the network, the hyperlink network data of INGOs was analyzed with three approaches: the fitness of core/periphery structure in a network (Borgatti & Everett, 1999), a two dimensional metric multidimensional scaling, and the measure of coreness of each actor. To conduct the three approaches, it was necessary to use social network analysis. Social network analysis was performed with UCINET 6.0 (Borgatti, Everett, & Freeman, 2002).

Further, an OLS regression was conducted to see if countries' world system positions correlated with countries' coreness. The world system positions of INGOs' countries-of-origin were assessed with two indexes. One is Bollen and Appold's (1993) ordinal variable, which categorized each country into one of the three categories: peripheral, semi-peripheral and central. The second was Gunaratne's (2002) index of world system position that was based on countries' Internet availability and the development level of countries' information technology industry.

The social network perspective views power as inherently relational (Wasserman & Faust, 1994). In other words, actors facing fewer constraints and having more opportunities are powerful actors in networks (Burt, 1992). Actors' network centrality measures are important indexes of actors' power in networks. Hypothesis 2 (a,

b, c, d & e) tested the effects of civil actors' countries-of-origin on their network centrality measures.

Degree centrality, closeness centrality and betweenness centrality are important individual level measures of network centrality (Hanneman & Riddle, 2001). Degree is simply the number of ties that an actor has. For a directional network, each actor has an indegree and an outdegree centrality. Indegree is the number of ties an actor receives. If an actor receives many ties, this actor is likely to be prominent or have high prestige. Research has found that prestigious actors are more likely to be the target of ties (Burt, 1992). Outdegree is the number of ties an actor sends out. If an actor has high outdegree, the actor is more likely to initiate contacts and to make others aware of his/her view, and therefore is more influential (Wasserman & Faust, 1994).

Closeness centrality (*H2c* & *H2d*) measures how close each actor is to other actors in a network. If an actor is able to reach other actor at a shorter path length than the majority, the actor has a small closeness. Small closeness means an actor occupies an advantageous position in a network (Wasserman & Faust, 1994). Closeness centrality as measured by the Eigenvector of geodesic distances is especially revealing in large and complex networks because this measure also takes into consideration of the prominence of an actor's connections (Hanneman & Riddle, 2001). In other words, actors connecting with more prominent others are more powerful in a network. Therefore, in this dissertation, closeness centrality as measured by the Eigenvector of geodesic distances was used.

Betweenness (*H2e*) measure if an actor lies in between of other pairs of actors. Betweenness centrality essentially measures actors' ability to control information

(Freeman, 1979). Actors that are closer to the middle of pathways have advantageous positions because they can decide whether or how they will disseminate a piece of information. When an actor with a small betweenness centrality communicates with others, the communication flow goes through fewer intermediaries (Hanneman & Riddle, 2001). Among measures of betweenness centrality, flow centrality measures the proportion of the entire flow between two actors and reveals how involved an actor is in all of the flows between all other pairs of actors. Therefore, in this dissertation, betweenness centrality as measured by the flow centrality was used.

Since each centrality measure provides additional unique information, this project run tests on all of these measures. After calculating each INGO's indegree centrality, outdegree centrality, (incoming and outgoing ties) closeness centrality and betweenness centrality, regression analyses were run to see if civil actors' countries-of-origin was a significant predictor of environmental INGOs' network centrality. Regression was used because this method was especially powerful in terms of exploring the relation between a set of independent variables and a response variable (Wooldridge, 2009).

Research Question 2 and Research Question 3 examined the relationship between INGOs' indegree centrality, outdegree centrality, closeness centrality and betweenness and each country's economic development level and democracy level. Data for each country's economic development level and democracy level were obtained from the World Bank and World Polity IV dataset. Further information was discussed in the data and measurements section.

Research Question 4 directed attention to the relationship between INGOs' network component structure and the world system positions of INGOs' countries-of-origin. This research question introduced a new measure: component structure. In social network analysis, there were many different approaches to examine the component structure of a network. This study used *k*-cores to identify subgroups in the network. The *k*-cores approach is a degree-based method to identify cohesive subgroups (Seidman, 1983). A *k*-core is a subgroup in which each node is adjacent to at least a minimum of *k* nodes in this subgroup.

Hypothesis 3 (a &b) directed attention to the numbers of visitors and followers that environmental INGOs' websites and Facebook accounts drew. The number of website visitors was obtained from Alexa Traffic Rank (<http://www.alexa.com/>), and the number of Facebook followers was obtained from the Facebook page of each INGO's Facebook account. A set of regression analyses were run to see if civil actors' countries-of-origin is a significant predictor of the number of visitors and followers that the INGO's online presence can draw.

Starting from research question 5, the focus of the analysis was shifted to the World Polity Theory. World Polity Theory emphasizes the value and influence of culture. In this study, countries' civilization types were based on Huntington's (1996) classification. Huntington provided a map that groups countries according to their civilization types (pp. 26-27). Further information was discussed in the data and measurements section.

Hypothesis 4 was also derived from the World Polity Theory and it continued to explore the relationship between INGOs' network structure and the civilization types of environmental INGOs' countries-of-origin.

World polity tie was another important variable according to the World Polity Theory (Boli & Thomas, 1997). This study focused on environmental INGOs; therefore each country's world polity ties were measured by the number of INGOs originated from that country.

Hypothesis 5 (a &b) looked at the relationship between the visitors/ followers of INGOs' Web presences and the world polity ties of environmental INGOs' countries-of-origin.

Starting from research question 7, attention was shifted to the Network Society Thesis. RQ7 examined the relationship between INGOs' issue areas and INGOs' network centrality. The group of environmental INGOs focused on 14 different environmental issue areas. Further information was discussed in the data and measurements section.

Research question 8 and research question 9 directed attention to the relationship between visitors/ followers of INGOs' Web presences and INGOs' issue areas. Regression analyses were carried out to see if INGOs' issue areas significantly influence the numbers of visitors/ followers of INGOs' Web presences.

Hypothesis 6 directed attention to the relationship between the component structure of this INGOs' network and each INGO's issue area. A multiple regression analysis was utilized to test if INGOs' issue areas significantly affect INGOs' network component structure.

Research question 10 and research question 11 directed attentions to the relationship between INGOs' virtual network structure and INGOs' years of operation. INGOs' years of operation were measured by counting the number of years an INGO has existed by 2011. Regression analyses were carried out to see if INGOs' years of operation affect INGOs' virtual network structure characteristics such as INGOs' network centrality and INGOs' network component structure. Regression analysis was used because this type of analysis allows the researchers to understand how certain values of the dependent variable vary with independent variables. Regression analysis detect if dependent and independent variables are related in a statistically significant way (Tabachnick & Fidell, 2007).

Research question 12 and 13 examined the relationship between the Internet connectivity of an environmental INGO's country-of-origin and the numbers of visitors/followers of INGOs' Web presences. Regression analyses were conducted to test if Internet connectivity was a significant predictor of INGOs' Web presences followers/visitors.

Finally, hypotheses 7 (a, b, c, d & e) examined the relationship between environmental INGOs' virtual network centrality measures and the Internet connectivity of environmental INGOs' countries-of-origin. Data of each country's Internet connectivity was obtained from the World Bank and detailed information will be discussed in the *Data And Measurements* section.

In sum, this section discussed each research questions and hypothesis, and how tests were run to address these questions. The next section presented data collection strategies including sampling strategy, data collection and measurement strategies.

Data Collection Strategies

Sampling. Sampling method in SNA is different from sampling methods in research focusing on actors' attributions (Wasserman & Faust, 1994). Actors included in attribution studies tend to be the result of probability sampling. The assumption is that each observation provides one piece of independent information. In SNA, actors included in a sample have interdependent relationships. This quality of network studies makes the specifications of boundaries of network a very important consideration in research design. In other words, in SNA, it is not necessary to have a probability sample; more importantly, the criteria of including nodes need to be clear and adhere to the research goals.

In the current study, the goal is to describe and examine the virtual network structure of environmental INGOs. Therefore, any INGO that met the following criteria was included: 1) had membership in more than one country; 2) the organization mainly focused on environmental protections as suggested by their mission statement; 3) the organization is non-profit and non-governmental. All the identifiable environmental INGOs were included to construct an as comprehensive as possible network of environmental INGOs.

Data and measurements. Data were collected at the organizational level. Some data for this research were hyperlink ties among INGOs. Information about environmental INGOs with memberships in more than one country was obtained from *The Yearbook of International Organizations* (2011). By far, *The Yearbook of International Organizations* (published by Union of International Associations) provides the most comprehensive data on INGOs, and this data source has been widely

used in INGO studies (Boli & Brewington 2007; Boli & Thomas, 1999; Landman 2005; Neumayer, 2005; Smith, 2005; Smith & Wiest, 2005).

Based on the information provided by *The Yearbook of International Organizations*, all the INGOs' websites and Facebook accounts were identified. The list of these INGOs' websites was fed into LexiURL Searcher. LexiURL Searcher is a web crawler that can be used to draw the hyperlinks among these international civil actors' websites. LexiURL Searcher was designed to automatically collect hyperlink data through the applications programming interfaces (APIs) provided by major search engines such as Yahoo! and Google (Mayr & Tosques, 2005). The obtained data were edited, and were developed into a directional network matrix. LexiURL first coded the data into DL language. Ucinet. can process DL language and generate a directional network matrix. This network matrix recorded two types of information. First, the direction of links among INGOs; specifically, the links a website received were defined as inlinks and the links a website sent out were defined as outlinks. Second, the number of hyperlinks among INGOs; because the software can mine all the hyperlinks within one website to another website, it is possible that between two websites there were more than one hyperlinks.

Further, organizational information such as membership type, organizational structure, years of operation, the language used by an organization on its website, each organization's country-of-origin, and areas of expertise were also coded.

Independent variables. Cultural context. In this study, cultural context was measured with nine dummy coded variables: African, Buddhist, Hindu, Islamic, Japanese, Latin American, Orthodox, Sinic, and Western culture. The nine cultural

types were adopted from Huntington (1996). Huntington provided a map that groups countries according to their civilization types (pp. 26-27). This study follows this map and a classification list that Henderson and Tucker (2001) have elaborated from the map (p. 335). (For details, see Table 2).

Insert Table 2 Here

Internet connectivity of environmental INGOs' countries-of-origin. Countries' Internet connectivity was measured by the average Internet bandwidth bit per second per capita (World Bank, 2011). International Internet bandwidth is the contracted capacity of international connections between countries for transmitting Internet traffics. This measure takes into consideration of how well people from one country can easily connect to others via the Internet and the population size of each country.

Issue areas. This research also explores the role that certain attributions of nodes play in explaining the particular manifestation of the network being examined. According to the Network Society perspective, a common issue area is an important foundation upon which civil actors can develop ties (Castells, 1996). In this study, following the classification of environmental INGOs' issue areas as proposed by *Global Environmental Action*, 14 issue areas (Sustainable Development=1, Biodiversity=2, Animal Rights=3, Forestry Protection and Plants Protection =4, Climate Change=5, Energy=6, Extractive Industries (Logging, Mining, and Oil Extraction)=7, Water Resource=8, Waste Procession, Recycling, Controlling Of Pollution=9, Indigenous People's Rights (People Facing Threats to Their Lands, Cultures, and Nature Resources)=10, Research and Information Sharing=11, Promoting Local and Global Connection and Networks=12, Grant Foundations=13, Mixed aims=14) were coded by

each organization's mission statement. Each issue area was described mainly by key words (e.g., climate change, animal protection, etc.). Organizations' mission statements can be found in the *Yearbook of International Organizations* or on INGOs' websites. The research conducted a content analysis of organizations' mission statements and classified organizations into different issue areas. For example, when a mission statement contains key words such as research, information sharing and education, this organization was coded as focusing on issue area 11. For organizational mission statements that contain more than two types of key words, those organizations are INGOs with mixed aims and their issue area=14.

Organizational information of INGOs. Information of environmental INGOs were obtained from *The Yearbook of International Organizations*. This source is a reliable and standard source for international organization data (Boli & Thomas, 1999). *The Yearbook of International Organizations* provides information on the membership, founding dates, mission statements, organizational structures, finances, activities, publications, and other characteristics of international organizations.

Countries' world system position. This study utilized two indexes of countries' world system positions. The first was a widely used ordinal variable, which categorizes countries into one of three categories: peripheral, semi-peripheral and central (peripheral=1, semi-peripheral=2, and central=3). This study adopts Bollen and Appold's (1993) update of Snyder and Kick (1979). This measure captures both economic and military power, and is considered a thorough treatment of the measures of world system position. In addition, to test the validity of this measure in relation to other similar WSP measures, a correlation analysis was conducted between this measure

(Bollen & Appold, 1993) and a more recent measure (Clark & Backfield, 2009). The analysis showed a high level of correlation ($r=.75$, $p<.01$). The high level of correlation confirmed the validity of the Bollen and Appold measure. More specifically, the differences between Bollen & Appold measure and Clark and Backfield measure mainly arose in regard to several countries' changing of WSPs. Brazil, China, India, Thailand, Mexico, Indonesia moved from the periphery category to be cores, while South Africa moved from a core country to a periphery country. A few changes were also found with the semi-periphery category, where Ivory Coast, Nigeria, Chile, UAE moved from periphery to semi-periphery.

The second index is information society power index. Using data from International Telecommunication Union (ITU) and World Bank, Gunaratne (2002) combined two information and communication technology based indexes: computing power index and high technology expert index to create an information society power index (ISPI). The information society power index helps to indicate countries' world system positions according to countries' development level in terms of information technology. This index assigns each state a score out of 100 that reflects its power position in the center-periphery structure.

Countries' level of economic development. In this study, as widely used in other research projects, level of economic development is measured as Gross National Income (GNI) per capita. According to World Development Indicators, GNI is "is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad" (World Bank, 2011, p. 13). GNI per

capita adjusts to the population size of each country while describing the economic size of each nation. For this study, data on each country's GNI per capita come from World Development Indicators 2011 (World Bank, 2011). The most current data is from 2009 so the GNI per capita data are reported in constant 2009 US dollars. Further, in the analysis, GNI per capita is logged to reduce skew.

Countries' overall democracy scores in 2011 from Marshall and Jagers' Polity IV data (2011) were used in this study. Polity IV is composite index of democracy with a scale from -10 (fully institutionalized authority regimes) to 10 (fully institutionalized democracies.). This scheme examines concomitant qualities of democratic and authority in governing institutions (For more details, please refer to the Polity IV Project by Marshall and Jagers, 2011). This index takes into consideration three essential elements of democracy: whether citizens can freely and effectively express their preference about alternative policies and leaders; whether there exist constraints on the executive power; and whether citizens enjoy civil liberties in daily life and political participation (for details, please review *Data Users Manual* from Marshall & Jagers, 2011, pp. 12-14).

World polity ties in 2011. To measure world polity ties, this study adopted a widely used measure by counting the number of INGOs originated from a state (Dale, 1999; Hafner-Burton & Tsutsui, 2005; Lewin, Long, & Carroll, 1999; Meyer, 2000; Meyer, Boli, Thomas, & Ramirez, 1997). This is a widely used measure because it can be tailored to different context. The original WST argues that intensive international organizations (including treaties, INGOs, IGOs, trade, international scientific and professional discourses) development bring a period of individual states' modernization.

The world civil society, as a comprehensive framework of influence, exerts its influence locally. In other words, important changes and the institutionalization process are transmitted by INGOs into each individual states. This measure allows scholars to count the institutional polity tie density within each country, therefore allow scholars to examine how likely INGOs in a country form a cohesive and strong influence. At the same time, because countries that join one type of organizations may not necessarily participate in other types of organizations. This measure allows scholars to count the influence from a specific type of organizations. For example, Hafner-Burton and Tsutsui (2005) counted countries' memberships with human rights organizations, and conducted a study of how human rights INGOs influence the implementation of human rights treaties in each nation. These raw data were collected from the *Yearbook of International Organizations* (2011).

Dependent variables. *Number of website visitors.* Alexa Traffic Rank provided by Alexa Internet Inc. was used to assess the traffic pattern of a site. Alexa Traffic Rank is produced based on data collected by one of the largest Web crawls. Among the information provided by Alexa Traffic Rank, it shows the percentage of global internet users who visited a particular site within three months. Three months is a relatively long enough period to show the popularity of a web site.

Number of Facebook followers. The data were obtained from the Facebook account of each organization.

Degree centrality. Degree centrality indicates the power attached to civil actors' network position in the communication network (Borgatti et al., 2002). In this study, degree centrality measures were calculated based on dichotomized dataset due to the

nature of these measures (Carrington, Scott, Wasserman, 2005). Indegree centrality represents the number of incoming hyperlinks an actor has in the network. Outdegree centrality represents the number of hyperlinks an actor sends out.

Closeness centrality. Closeness centrality as measured by the Eigenvector of geodesic distances will be used in this study. The Eigenvector centrality is measured by the following equation (Bonacich, 1972):

$$C_i = \sum (C_{max} - C(V_i))$$

Where C_{max} is the maximum eigenvector centrality and $C(V_i)$ the eigenvector centrality of vertex V_i .

Betweenness. Betweenness as measured by flow centrality will be used in this study. The betweenness based on network flow is measured by the following equation (the measure varies between 0 and 1) (Freeman, Borgatti, & White, 1991):

$$C_F(p_i) = \frac{\sum_{j < k}^n \sum_{j < k}^n m_{jk}(x_i)}{\sum_{j < k}^n \sum_{j < k}^n m_{jk}}$$

Where $\sum_{j < k}^n \sum_{j < k}^n m_{jk}(x_i)$ is the maximum flow from x_j to x_k that passes through x_i , and $\sum_{j < k}^n \sum_{j < k}^n m_{jk}$ is the total flow between all pairs of points where x_i is neither a sender of ties nor a receiver of ties.

Coreness. Coreness is a value that estimates the closeness of each actor to the core of a network (Borgatti & Everett, 1999). Coreness measures the pattern of core-peripheral in a network, and a higher coreness indicated that an actor was closer to the core of a network.

k-cores membership. K-core is a method to identify subgroups in a network that is especially useful with large networks (Hanneman & Riddle, 2010). The *k*-core method defines members of a group according to how many in-group members an actor has connection with. In other words, if an actor connects with *k* members of a group, this actor is considered an in-group member of this group, regardless of how many other members this actor may have connection with. This relatively loose definition of subgroup membership suggests that if an actor has a sufficient number of ties to a group of actors, they may be part of this group even if they don't connect with some other members of the group. The emphasis here is not on immersion but on connection. Empirical indicators that can help answer those research questions and test hypotheses were defined and operationalized. The researcher used Ucinet to run a *k*-core analysis and identified 11 *k*-core groups. Each organization was assigned a *k*-core membership value (range from 1 to 11). These values were further entered into the database as a variable named "k-core membership" for further analysis.

In sum, this chapter laid the conceptual, operational and methodological ground for the analytical portion of this dissertation. The three perspectives introduced in previous chapter offered competing explanations and predictions of INGOs' virtual networks. These competing arguments led to a set of research questions and hypotheses. Specifically, RQ1 address the general trend of INGOs' basic use of websites and social media. RQ 2-4 and H1-3 test the effect of countries' world system positions and economic and democracy development level on INGOs' network structure. RQ5-6 and H4-5 test the effect of world polity ties and culture on INGOs' network structure. Finally, RQ 8-13 and H6-7 test the effect of issue area, years of operation and Internet

connectivity on INGOs' network structure. The next chapter reported findings to each question and hypothesis.

Chapter 5: Results

This chapter presented major findings of this dissertation. The main goals of the project include: 1) providing a description of the virtual network structure of INGOs working in the environmental protection area; and 2) testing hypotheses and research questions derived from World System Theory, World Polity Theory and Castells' (1996, 2002, 2004, 2008, 2009) Network Society Thesis. To facilitate readers' understanding of the extensive analysis and the specific implications of findings, this chapter was organized around the aforementioned major goals and theories.

The first section, *Descriptive Findings*, presented a description of the basic conditions of the group of environmental INGOs and their new media use patterns. The virtual network structure of the group of global civil actors is also discussed. The second section, *World System Theory Related Findings*, discusses results related to World System Theory. The third section, *World Polity Theory Related Findings*, covers the results related to hypotheses and research questions rooted in World Polity Theory. Finally, the fourth section, *Network Society Thesis Related Findings*, presents results related to hypotheses and research questions derived from Castells' (1996, 2002, 2004, 2008, 2009) discussion of the Network Society.

Descriptive Findings

A basic description of the sample. Overall, 509 environmental international nonprofit and nongovernmental organizations (environmental INGOs) were identified from the *Yearbook of International Organizations*. The 509 INGOs all focused on different areas of environmental issues; they had offices or membership in at least two countries and they were not founded by any governments. These INGOs had

headquarters in 86 different countries and regions of the world (See Table 3 for details). This finding suggested that environmental INGOs had representations and influences in a large part of the world. People from many nations were involved in founding and organizing environmental INGOs. Such a phenomenon suggested a wide spread awareness of environmental issues around the globe.

Insert Table 3 Here

Among these 509 environmental INGOs, the majority originated from developed core countries such as the United States (21.0%), United Kingdom (9.6%), France (7.3%) and Belgium (6.3%) (See Table 1 for details). A considerable number of organizations located in periphery countries such as Kenya (2.2%), and India (1.6%). In comparison, fewer organizations originated from semi-periphery countries such as Ireland (0.2%), Israel (0.2%), Georgia (0.2%) and Singapore (0.2%). This finding suggested that a country's world system position may influence the number of environment INGOs the country has. To test this idea, a standard multiple regression analysis was performed. Core countries were the reference group. The regression analysis found a country's world system position had a significant impact on the number of INGOs originated from the country. For instance, the United States is a core country and it is also the country from which most of INGOs originate. It was found that R for regression was significantly different from zero $F(2, 495) = 83.432, p < .001$, with $R^2 = .252$ and adjusted $R^2 = .249$. About 25.2 % of variance in the number of environmental INGOs each country had can be explained by the world system position of a country. Specifically, the unstandardized coefficient for peripheral countries was -44.754, $t(495) = -9.718, p < .001$. This coefficient suggested that peripheral countries, on

average, had about 45 less environmental INGOs than core countries. Further, the coefficient for semi-peripheral country was -45.524 , $t(495) = -9.7817$, $p < .001$. This coefficient suggested that semi-peripheral countries, on average, had about 45 less environmental INGOs than core countries. This phenomenon may be due to the fact that core countries had more resources while periphery countries face more pressing environmental issues (Bennett, 2003). Further, this finding was also consistent with Beckfield's (2003) finding that there was a high level of inequality in INGO ties among nations. Beckfield also found that although the inequality among nations in terms of INGO ties was declining, the inequality among INGO ties was relatively stable. This study was conducted eight years from Beckfield's research, and the same finding of large inequality of INGO ties suggested the same trend persisted.

In terms of membership, the majority of these environmental INGOs were membership-based organizations (84.8%), and membership fees were an important financial source for them. This finding highlighted the importance for these INGOs to maintain good relationships with members. Among these environmental INGOs, 32.0% were formed by organizational members. In other words, those organizations were networks or congregations of smaller NGOs or other institutions operating in different countries. A significant number of the 509 organizations (46.0%) included individual-based memberships, and recruited individual members from all over the world. For example, an organization named *International Network for Environmental Compliance and Enforcement* attracted members from 100 different countries. Another INGO, *International Network for Environmental Compliance and Enforcement*, drew members from 120 different countries. Together, these two types of membership accounted for

the majority of INGOs' membership type (78%). In other words, most INGOs operated as transnational networks of either smaller organizations or individuals. For such a decentralized structure, reliable communication technologies can be crucial.

In terms of the number of countries from which these environmental INGOs drew members, on average, these INGOs attracted members from about 29 countries. Nevertheless, there existed a big difference among organizations ($SD=34.91$). The majority of these organizations (60%) drew members from about 20 countries, and only a few organizations (3.8%) drew members from more than 100 countries. It was clear that some of these environmental INGOs, especially the 3.8% truly had a global influence. For example, *Earth Day Network* had members in 192 countries and World Organization for Animal Health drew members from 172 countries. How to reach such a diverse and geographically stretched audience may become an issue in these organizations' daily operation.

In terms of issue areas, the study coded environmental INGOs' issue areas according to the following fields: sustainable development, biodiversity, animal rights, forestry protection and plants protection, climate change, energy, extractive industries (logging, mining, and oil extraction), water resources, waste procession, recycling, controlling of pollution, indigenous people's rights (people facing threats to their lands, cultures, and nature resources), research and information sharing, promoting local and global connection and networks, grant foundations, and mixed aims. Among these environmental INGOs, a significant percentage focused on research, education and information sharing (20.6%). The second major area was sustainable development (14.3%) and the third major area was animal rights (13.2%). In other words, the

majority of the INGOs focused on three issue areas. From the analysis, it was unclear, why among the 14 issues, most INGOs chose to focus on the three areas. Speculations about reasons of this phenomenon are discussed in Chapter 6.

Further, in terms of years of practice, among these environmental INGOs, 48.5% have been established for more than twenty years, and 10.4% have been established after 2000. This information suggested that many of the INGOs were well established. This finding is slightly different from studies focusing on local NGOs. Although many local NGOs have relatively short organizational life circles (Ben-Eliezer & Kemp, 2008), INGOs seems to have a relatively longer life circle. It could be the case that successful local NGOs gradually developed into international INGOs, and therefore these INGOs have longer history.

In terms of the languages used by environmental INGOs, overwhelmingly, English was the dominant language. Among these INGOs, 69.9% used English as the sole working language, and 23.5% used English in combination of other languages. Only 6.6% did not use English as their working language. Besides English, French was the second most used language (11.6%) and Spanish was the third most used language (7.5%). This finding may be due to the fact that most of these environmental INGOs operating at the international level. To communicate with a globally diverse audience, English may be the most ideal language. Nevertheless, in many countries, the majority of the population does not speak English. The current situation may become a barrier for INGOs to reach more people in countries where English is not local residents' native language.

Global civil actors' new media use. Research question 1 asked how environmental INGOs used websites and social media such as Facebook. The study found that among these INGOs, the majority have functioning organizational websites (89.8%) and 10.2% of those INGOs either had bad links or did not have organizational websites. This finding suggested that INGOs across the world are eager to adapt websites. This finding made sense in the context of the previously discussed INGOs' communication needs. As showed in the aforementioned analysis, INGOs need to maintain communication across nations. Websites can be used as convenient platforms to provide information, recruit members and organize collective actions; it is reasonable that many INGOs chose to adopt websites.

Indeed, websites helped INGOs to communication with a globally diverse audience. According to the data mining results from Alexa Traffic, many of these websites attracted visitors from more than one country (46.4%). Some websites even attracted visitors from more than 10 countries (25.8%). For example, the websites of Greenpeace attracted visitors from 33 countries and the top three countries where most visitors came from were Netherlands, Argentina and Turkey. On average, these websites attracted about .004 ($SD= .018$) of global Internet users. Given the huge population of global Internet users (about 2.7 billion) (World Bank, 2011), these websites had attracted a considerable number of visitors. On average, visitors to these websites spent 2 minutes and 35 seconds ($SD=137.8$ seconds) on these websites. Since most INGOs seek to attract international visitors, it is interesting to see visitors from which country were most likely to visit INGOs' websites. This study found that for environmental INGOs, people from the U.S. were most likely to visit their websites. In

about 9.1% of the cases, the United States was among the top three countries from which INGOs drew their visitors.

In comparison to websites, fewer organizations have adopted social network media such as Facebook, Tweeter, LinkedIn, MySpace and YouTube (only 54.8% have adopted social network media). For these INGOs, if they did adopt social networking media, Facebook was the most popular choice (37.5%). Only 9% adopted more than one type of social media and a few (5.6%) adopted more than 5 types. This finding may suggest that many INGOs rely heavily on Facebook and therefore.

Further, to examine what external factors may affect INGOs' adoption of website and social media, a correlation analysis suggested that the measure of countries' world system positions in terms of information society power index (ISPI) significantly correlated with whether an organization had a website ($r=.093, p<.05$) and the number of social media an organization adopted ($r=.133, p<.01$). Further, ISPI also significantly correlated with whether an organization would adopt Facebook ($r=.212, p<.01$). In other words, the higher a country's information technology index value is (the more likely a country is to be a core), the more likely an INGO originated from this country would have a website; would adopt multiple types of social media; and would have a Facebook account (See Table 4 for details). For example, the United States had an index value of 37.75 and Kenya had the index value of .01. Therefore, it was far more likely for an organization originating from the United States to have a website; to use more types of social media and to adopt Facebook than it was for one from Kenya to exhibit such connectivity.

Not surprisingly, this study found that organizations' website ownership also significantly correlated with their adaption of social media ($r=.188, p<.01$) and their Facebook use ($r=.492, p<.01$).

Insert Table 4 Here

In sum, to answer research question 1, this study found that while websites were widely adopted by INGOs, social media were less frequently used by INGOs. Websites have attracted a lot of visitors around the globe and functioned as important platforms through which these organizations communicated with their publics. Further, the study found that both website ownership and the number of social media used by INGOs positively and significantly correlated with the countries' world system positions as measured by countries' ISPI. This finding suggested that besides INGOs' communication needs, other external factors such as the ISPI of their countries-of-origin may also affect INGOs' new media adaption.

A description of the virtual network. In terms of the basic and overall structure of the network, this section reported some typical statistics of the overall network structure: the network size, average density, Geodesic distance, reciprocity transitivity and overall clustering coefficient. The analysis first identified a virtual network among this group of INGOs. Networks among INGOs indicate there are cooperative relationships among those INGOs outside of their traditional headquarter-subunit structure. Such a transnational network helps to connect different locals into a global sphere (See Figure 1 for example).

Insert Figure 1 Here

The *network size* measures the number of unique actors in the network. This measure helps to illustrate how big the network is (Wasserman & Faust, 1994). Network size is critical for the structure of social relationships. Networks with different network sizes often have different structures. For this project, the network size was 455. In other words, 455 unique websites were found and the data mining software retrieved hyperlinks among the group of websites.

The *density* of a binary network is defined as the proportion of all possible ties that are actually present in the network (Wasserman & Faust, 1994). Overall, the average network density was 0.0106 ($SD=0.1578$). This suggested that 1.06% of all the possible ties were present. In comparison to the mean, the standard deviation was large, suggesting there was considerable variance within this network regarding network density. In other words, some areas within the network were denser than other areas. This network structure is normal when compare with studies during with similar networks (Bae & Choi, 2000; Barnett, 1999). As can be observed from Figure 1, a group of actors positioned in the center were well connected and were surrounded by a group of less-well connected actors. Far away from the center, there were some isolated actors that were not connected with any other actors. For example, an INGO from Samoa, *Environment Fellowship of Rotarians* was a relatively isolated node in the network. In contrast, *Water Solidarity Network*, an INGO from Morocco had more connections. Further, *Renewable Energy, Environment and Solidarity Group*, a French INGO, located in the center of connections.

The *geodesic distance* is a widely used measure that helps to describe the structure of the network as a whole. Geodesic distance is the number of relations within

the shortest possible “walk” (the length of a walk is the number of lines it contains) from one actor to another (Wasserman & Faust, 1994). The geodesic distance is the optimal and most efficient path in terms of transmitting information. This is because when two actors communicate through geodesic distance, their information passes through the least number of other actors. In terms of hyperlinks, geodesic distance means the smallest number of websites one visitor needs to pass through should the visitor wish to navigate from website A to website B. For this network, the average distance=3.176, meaning that starting from one random website, to reach another random website, a visitor on average passes through about 3 websites. Further, the distance-based cohesion value=0.055 (This value ranges from 0 to 1; larger values indicates greater cohesiveness). Given the fact that in society, it has been suggested that 6 degrees of separation was rather common (Granovetter, 1973), it can be argued that this average geodesic distance was relatively short and it was relatively easy for a visitor to navigate from one website to another.

Reciprocity indicates the percentage of all possible ties as parts of reciprocated structures (Bae & Choi, 2000). Reciprocity is an important measure for the study of civil society. According to Putnam (1993): “social trust in complex modern settings can arise from two related sources-norms of reciprocity and networks of civic engagement” (p. 171). Reciprocity demonstrates a type of relationships in which different parties exchange favor and share information. In a network environment, network structures play an important role in coordinating behaviors (Burt, 1992). In a network with a high level of heterogeneity (such as the global civil society), reciprocity facilitate long-term relationship building (White, 2000).

The focus of reciprocity is on dyadic relationships. In other words, if there is a reciprocal relationship between two actors A and B, that means when A sends a tie to B, B will send a tie back to A. The extent to which a network is characterized by “reciprocated” ties may tell us about the degree of cohesion in this network (Wasserman & Faust, 1994). For this network, the analysis showed that the average reciprocity= 0.0445. In other words, within this network, 4.45% of ties were reciprocated. Further, since each tie connected two actors, this finding also suggested that 9.00% actors were involved in reciprocal relations. Some scholars have suggested that networks demonstrate an equilibrium tendency toward dyadic relationships to be either null (no ties exist) or reciprocated and that asymmetric ties may be unstable (Hanneman & Riddle, 2011). For a network to maintain high levels of asymmetric dyadic relationship, either there exist a hierarchy in the network to prevent the development of reciprocal relationships, or more changes will emerge soon in the network. This study found that about 9.00% actors had symmetric ties while the majority did not achieve such a status. This finding suggested that this network is not a stable or equal network. Based on this finding, it can be argued that either there existed a hierarchical structure in this network, or this was an evolving network. Due to the fact that this study was not based on a longitudinal design, the lack of the time dimension prevented this study from making a conclusive assertion. A triad is the smallest social structure that has the character of a society (Wasserman & Faust, 1994). A triad includes dyadic relationships. In a triad, there also is a tendency to reach equilibrium and consistency of social structure. In a triad, hierarchy is also more apparent than in a dyad (Hanneman & Riddle, 2011). Some network scholars argued that the most interesting questions of social structure arise with

regard to triads (Barabasi, 2002). This is because the smallest social structure that has the character of a society is a triad. *Transitivity* as an overall indicator provides information about the proportion of triads that are transitive. Transitivity is an extension of reciprocity (Wasserman & Faust, 1994). In other words, a triad is formed when website A directs a link to website B; B directs a link to Website C; and then A also directs a tie to C. Within this network, 3731 transitive triples were found. Overall, the percentage of ordered triples in which a single link could complete the triad was 29.92%. The existence of higher transitivity often suggested that the ideology or interests among actors are consistent. In other words, actors are not divided by competing interests. Since this network captures environmental INGOs, it is reasonable to observe the moderate level of transitivity.

In large networks, it is often observed that a group or groups of actors are connected to one another and are clustered into neighborhoods. This is the famous “small world phenomenon” (Milgram, 1967), which is the combination of short average path lengths over the entire graph mixed with a strong degree of clustered local neighborhoods. The overall graph clustering coefficient is the average of the densities of the clusters of all of the actors. For this network, the overall clustering coefficient was 0.793. This coefficient suggested that in this network, when an actor was embedded in a cluster, it was often a highly dense cluster with 79.3% of all possible ties present. The weighted overall clustering coefficient was 0.118. The difference between the weighted and un-weighted coefficients was that the weighted coefficient gives weight to the neighborhood density proportional to their size. Therefore, actors with larger clusters get more weight in computing the average density. Since this network density

was relatively small (average network density=0.0106), it was reasonable that the weighted coefficient was smaller than the un-weighted version, which suggested that the density of local clusters were much higher than the density of the whole graph. In other words, there were some well-connected clusters existing in this network but many actors did not get to be part of such clusters.

A close examination of each individual node cluster coefficients suggested that a small group of websites were embedded in highly dense clusters. Being embedded in a dense network did not necessarily suggest that an actor was well-connected. For example, the organizational website of Plant Resources of Tropical Africa had only three ties, but all of the possible ties among its neighbors were present. Some websites were well-connected but did not belong to highly clustered groups. For example, the website of the INGO named *Convention on Biological Diversity* had 1891 ties, but only 19.5% of all the possible ties among its neighbors were present. There were also a considerable number of websites not well-connected and at the same time not embedded in any clusters. For example, the *Southeast Asia Network for Environmental Education* was an isolate in this network, and of course it also did not belong to any cluster.

In sum, the above reported network indexes provided an overall description of the network. This was a relatively large size network, which was consisted of 455 actors. The density of this network was relatively low, which suggested considerable possibility for these INGOs to further develop hyperlink relationships. An important finding was that the density was not distributed evenly among actors. As can be seen from the Figure 1, a group of core actors were extremely well-connected; the majority were connected; and some actors were isolated from other INGOs' websites. Further,

findings revealed that the average distance between two random actors was relatively small. About 10 percent of actors were involved in reciprocal relationships and about 30 percent of triples were transitive. These findings suggested that this network was either evolving or there was a hierarchical structure in the network. Consistent with the findings about transitivity and reciprocity, the cluster analysis showed that when a website was embedded in a cluster, it was often a highly dense cluster. In combination, the three indexes suggested that a considerable number of INGOs engage in developing reciprocal or transitive relationships. Such activity leads to some high density clusters. However, the existence of high density clusters did not contribute to a higher overall density, which suggested that many tie building actions happen within clusters rather than among clusters.

World System Theory Related Findings

World System Theory argues that countries' world system positions have profound influence on organizations' behavior and communication patterns. To test if the classification of countries based on competitive capital accumulation and economic structure serve as a predictor of INGOs' virtual network positions, a set of research questions and hypotheses were proposed. Findings were presented in the following section.

Hypothesis 1. First, in order to refresh the readers' memory of hypothesis 1, it was restated as following:

H1: The structure of environmental INGOs' virtual communication network presents a core-peripheral pattern.

Hypothesis 1 predicted that the structure of global civil actors' virtual communication network presented a core-peripheral pattern. H1 directed attention to the overall structural pattern of the environmental INGOs' virtual network. In order to test the structure of the network, the hyperlink network data of INGOs were analyzed with social network analysis.

The study of core-periphery structure was quite prevalent in world system research (Snyder & Kick, 1979; Smith & White, 1992), organizational research (Borgatti & Everett, 1999), and scientific citation networks (Doreian, 1985). The structure has even been observed and documented among a group of Japanese monkeys (Corradino, 1990). As noted by Borgatti and Everett (1999), different authors often use the term core-periphery structure in different ways. The core-periphery structure was named after two extreme spectrums, and the spectrums contain semi-periphery as well.

This dissertation follows the definition of Borgatti and Everett (1999) and used both categorical (core, semi-periphery-periphery) and continuous measures (ranging from core to periphery, including semi-periphery) to examine the presence of a core/periphery structure.

Following Borgatti and Everett (1999, p. 378), equation 1 was used to calculate the fitness of core/periphery structure in this network. This definition provided a viable basis for statistical methods of testing whether a given network had a hypothesized core-periphery structure. Further, this definition allows the existence of multiple cores (each with its own sets of peripheries) in a network, and therefore is more likely to meet the situation of a global network.

$$\rho = \sum_{i,j} a_{ij} \delta_{ij}$$

Where a_{ij} indicates the presence or absence of a tie in the observed data, δ_{ij} indicates the presence or absence of a tie in the ideal core/ periphery structure. Further, ρ achieves its maximum value when the matrix of a_{ij} and the matrix of δ_{ij} were identical, which suggests that matrix of a_{ij} has a perfect core/ periphery structure. The value of ρ ranges from 0 to 1, the larger the ρ value, the closer a matrix is to a perfect core/ periphery structure. For this network the $\rho=.362$. According to the QAP permutation test, this value achieved statistical significance ($p <.01$). Therefore, H1 was supported and it can be concluded that there was evidence to believe that in this group of environmental INGOs, some INGOs form a core while the others form a periphery.

To further verify the finding from an alternative approach, a two dimensional metric multidimensional scaling was performed. As can be seen in Figure 2, the results of the two-dimensional scaling can account for 41.9% of the variance in the network. At the center of the figure were a few organizations such as World Wildlife Fund, Greenpeace, and International Union for Conservation of Nature. The less well connected organizations appeared further from the center. The closer to the center, the nodes are sparser while the closer to the peripheral, nodes are denser and overlapping with each other.

Insert Figure 2 Here

Nevertheless, as noted by Borgatti and Everett (1999), fitting a core/ periphery model reduces a network to a single attribute of actors. Only to report a dichotomized core/ periphery fitness is in fact only to provide a single summary value that describes

the pattern of actors' positions. It is more interesting to further explore what factors can contribute to the core/ periphery characteristics of environmental INGOs. To achieve this goal, a continuous core/ periphery test was run on the set of INGOs. This continuous model abandoned the discrete model and assigned a measure of coreness to each actor. The coreness measures the pattern of ties in the network, and a higher coreness indicated that an actor was closer to the core of a network.

To test if a country's world system position significantly predicts its INGOs' coreness, a standard multiple regression analysis was performed. The independent was Bollen and Appold's (1993) ordinal variable, which categorized each country into one of the three categories: peripheral, semi-peripheral and central. It was found that R for regression was significantly different from zero $F(2, 444) = 2.879, p < .05$ with $R^2 = .013$, and adjusted $R^2 = .008$. About 1.3% of variance in the coreness of INGOs' online communication network can be explained by the world system position of an INGO's country-of-origin. Core country is the reference group. Specifically, the effect on semi-peripheral is significant, and the unstandardized coefficient = $-.013, t(444) = 1.916, p < .05$.

In this study, there was another measure of countries' world system positions: the information society power index (ISPI) (Gunaratne, 2002). When run an OLS regression with ISPI as the independent variable, again, R for regression was significantly different from zero $F(1, 445) = 4.760, p < .05$ with $R^2 = .011$, and adjusted $R^2 = .008$. About 1.1% of variance in the coreness of INGOs' online communication network can be explained by the world system position (as measured by ISPI) of an INGO's country-of-origin. The unstandardized coefficient = $.007, t(445) = 2.182, p < .05$.

Together, the aforementioned two analyses confirmed that countries world system positions significantly predict INGOs' coreness. Therefore, for H1, the analysis found that the structure of global civil actors' virtual communication network presents a core-peripheral pattern, and this pattern was influenced by countries' world system positions.

Hypothesis 2(a, b, c, d, & e). First, in order to refresh the readers' memory of the five hypotheses, hypothesis 2 (a, b, c, d, & e) were restated as follows:

H2 (a): Environmental INGOs' network centrality as measured by indegree centrality is significantly predicted by the world system positions of environmental INGOs' countries-of-origin.

H2 (b): Environmental INGOs' network centrality as measured by outdegree centrality is significantly predicted by the world system positions of environmental INGOs' countries-of-origin.

H2 (c): Environmental INGOs' network centrality as measured by (incoming tie) closeness centrality is significantly predicted by the world system positions of environmental INGOs' countries-of-origin.

H2 (d): Environmental INGOs' network centrality as measured by (outgoing tie) closeness centrality is significantly predicted by the world system positions of environmental INGOs' countries-of-origin.

H2 (e): Environmental INGOs' network centrality as measured by betweenness (Freeman Betweenness Centrality) is significantly predicted by the world system positions of environmental INGOs' countries-of-origin.

The independent variables were two measures of countries' world system positions. The first measure was the information society power index (Gunaratne, 2002). The second measure was Bollen and Appold's (1993) ordinal variable.

Hypothesis 2(a) employed indegree centrality as the dependent variable. Degree centrality is defined as the number of ties a node has. Depending on the direction of ties, in a directed network, each node has both indegree centrality and outdegree centrality. Specifically, indegree is a count of the number of ties directed to a node and out degree is the number of ties that the node sends out to others. Indegree, therefore, is a measure of actors' prestige (Wasserman & Faust, 1994). For this study, the average mean indegree was 4.813 ($SD=9.086$). Figure 3 presented an image of this network, in which the size of each node was proportionate to its indegree centrality. As can be seen from Figure 3, a few nodes had huge indegree centrality while most nodes had relatively small indegree centrality, and a few nodes were isolates.

Insert Figure 3 Here

Further, this pattern was demonstrated in Figure 4, which captured the 15 nodes with the largest indegree (the 15 nodes with indegree centrality 4 standard deviations away from the mean). The line width was proportionate to the strength of relationships among nodes. The 15 nodes, therefore, can be considered as the most prestigious nodes in this network (including nodes such as Greenpeace and Wildlife Conservation Society, etc.), and it was clear that the 15 nodes were tightly connected with each other and form a prestigious club.

Insert Figure 4 Here

For indegree centrality (See Table 5 for details), in Model 5_1, and all subsequent models on Table 5, each cell reported the unstandardized coefficient with the unstandard error in parentheses. H2(a) predicted that INGOs' network positions as measured by indegree centrality were significantly predicted by the world system positions of the civil actors' country-of-origin (as measured by ISPI). An OLS regression was performed, H2 (a) was rejected. R for regression was not significantly different from zero, $F(1, 427) = .000$, *n. s.*, with $R^2 = .002$, and adjusted $R^2 = .000$. Only about 0.2% of variance in indegree centrality can be explained by the world system position of an organization's country-of-origin. It appeared that the world system position cannot significantly predict which organization would become prestigious actors in the network.

In Model 5_2, the effect of world system positions on indegree centrality was tested. Again, H2 (a) was rejected. R for regression was not significantly different from zero, $F(2, 444) = .166$, *n. s.*, with $R^2 = .001$, and adjusted $R^2 = .000$. Only about 0.1% of variance in indegree centrality can be explained by the world system position of INGOs' countries-of-origin. One interesting finding was the negative sign of both semi-peripheral and peripheral countries. Given the fact that indegree centrality was a measure of actors' prestigious level in the network, this finding suggested that organizations originated from semi-peripheral and peripheral countries tend to be less prestigious than organizations from core countries. However, the difference failed to achieve statistical significance.

Insert Table 5 Here

Hypothesis 2 (b) employed outdegree centrality as the dependent variable. As mentioned before, depending on the direction of ties, in a directed network, each node has both indegree centrality and outdegree centrality. Specifically, outdegree is a count of the number of ties that the node sends out to others. Outdegree, therefore, is a measure of actors' willingness to develop relationships with other actors (Wasserman & Faust, 1994). For this study, the average mean outdegree was 4.813 ($SD=33.328$). Figure 5 presented an image of this network, in which the size of each node was proportionate to its outdegree centrality. As can be seen from Figure 4, when compared with Figure 2, fewer nodes had huge outdegree centrality while most nodes had relatively small outdegree centrality, and a few nodes were isolates. This finding suggested that the difference among nodes in terms of outdegree centrality was even larger than for indegree centrality.

Insert Figure 5 Here

Further, as demonstrated in Figure 6, which captured the 22 nodes with the largest outdegree (the 22 nodes with outdegree centralities that were 4 standard deviations away from the mean). The line width was proportionate to the strength of relationships among nodes. The 22 nodes, therefore, can be considered as the nodes were most willing to develop ties with others in this network. Again, it was clear that the 22 nodes were tightly connected with each other. A close examination revealed that most of the nodes with large indegree centrality were not necessarily with large outdegree centrality. For example, Wild Care Africa was an organization with the largest outdegree centrality, but it only had normal indegree centrality.

Insert Figure 6 Here

For outdegree centrality (See Table 6 for details), in Model 6_1, and all subsequent models on Table 6, each cell reported the unstandardized coefficient with the unstandard error in parentheses. H2(b) predicted that global civil actors' network positions as measured by outdegree centrality were significantly predicted by the world system positions of the civil actors' country-of-origin (as measured by information society index). An OLS regression was performed, and H2(b) was rejected. R for regression was not significantly different from zero $F(1, 427) = 1.220, n. s.$, with $R^2 = .003$, and adjusted $R^2 = .001$. Only about 0.3% of variance in outdegree centrality can be explained by the world system position of an organization's country-of-origin.

In Model 6_2, the effect of world system positions (as measured by the categorical variable) on outdegree centrality was tested. In this model, H2 (b) was supported. R for regression was significantly different from zero $F(2, 444) = 3.711, p < .05$, with $R^2 = .016$, and adjusted $R^2 = .012$. Specifically, the coefficient of semi-peripheral country was 13.236, $t(444) = 2.722, p < .01$. The coefficient suggested that organizations originated from semi-peripheral countries had an outdegree centrality that was 13.236 larger than organizations originated core countries. Given that outdegree centrality was a measure of an actor's willingness to develop relationships with others, it can be said that organizations originating from semi-peripheral countries were more eager to develop relationships with others. The positive value of the coefficient of peripheral countries also suggested that, when compared with organizations originated from core countries, organizations from peripheral countries were more willing to develop relationships with other actors. It is interesting to notice here that although both measures (continuous & categorical) of world system theory were tested on

outdegree centrality, they actually lead to different results. Given the fact that the information society index focused on the information technology aspect of world system, it is possible that this aspect of world system exerted a limited influence on INGOs' outdegree centrality.

Insert Table 6 Here

Hypothesis 2 (c) employed (incoming ties) closeness centrality as the dependent variable. Closeness centrality measures how close an actor was to other actors in the network. An actor with high closeness centrality can quickly interact with other actors. Based on the direction of ties, the incoming tie closeness centrality and the outgoing tie closeness centrality were calculated for each node. Specifically, for incoming ties closeness centrality, the average= 0.270 ($SD=0.056$). As can be seen from Figure 7, given the relatively small standard deviation, the differences among nodes in terms of incoming ties closeness centrality was not very dramatic.

Insert Figure 7 Here

For (incoming ties) closeness centrality (See Table 7 for details), in Model 7_1, and all subsequent models, each cell reported the unstandardized coefficient with the unstandard error in parentheses. H2(c) predicted that global civil actors' network positions as measured by (incoming ties) closeness centrality were significantly predicted by the world system positions of the civil actors' country-of-origin (as measured by information society index). An OLS regression was performed, H2(c) was rejected. R for regression was not significantly different from zero $F(1, 428) = .943, n.s.$, with $R^2 = .002$, and adjusted $R^2 = .000$. Only about 0.2% of variance in (incoming ties)

closeness centrality can be explained by the world system position of an organization's country-of-origin.

In Model 7_2, the effect of world system positions on (incoming ties) closeness centrality was tested. In this model, H2 (c) was partially supported. Although R for regression was not significantly different from zero $F(2, 445) = 2.001, n. s.$, with $R^2 = .009$, and adjusted $R^2 = .004$, the coefficient for semi-peripheral countries was significant. Specifically, the coefficient for semi-peripheral countries was $-.016, t(445) = -2.001, p < .05$. The coefficient suggested that organizations originated from semi-peripheral countries had an (incoming ties) closeness centrality that was .016 smaller than organizations originated core countries. Given that (incoming ties) closeness centrality was a measure how close an actor was to other actors, it can be said that organizations originated from semi-peripheral countries were less close to other actors than core country INGOs. The negative value of the coefficient of peripheral country also suggested that, when compared with organizations originated from core countries, organizations from peripheral countries were less close with other actors.

Insert Table 7 Here

Hypothesis 2 (d) used outgoing ties closeness centrality as dependent variable. Based on the direction of ties, the outgoing tie closeness centrality ($Mean = 0.270, SD = 0.084$) was calculated for each node. As can be seen from Figure 8, similar to incoming ties closeness centrality, given the relatively small standard deviation, the differences among nodes in terms of incoming ties closeness centrality was not very dramatic.

Insert Figure 8 Here

For (outgoing ties) closeness centrality (See Table 8 for details), in Model 8_1, and all subsequent models, each cell reported the unstandardized coefficient with the unstandardized error in parentheses. H2 (d) predicted that INGOs' network positions as measured by (outgoing ties) closeness centrality were significantly predicted by the world system positions of the civil actors' country-of-origin (as measured by information society index). An OLS regression was performed; H2(d) was rejected. R for regression was not significantly different from zero $F(1, 428) = .943, n. s.$, with $R^2 = .002$, and adjusted $R^2 = .000$. Only about 0.2% of variance in (incoming ties) closeness centrality can be explained by the world system position of an organization's country-of-origin.

In Model 8_2, the effect of world system positions on (outgoing ties) closeness centrality was tested. In this model, H2 (d) was rejected. R for regression was not significantly different from zero $F(2, 445) = .066, n. s.$, with $R^2 = .000$, and adjusted $R^2 = .000$.

Insert Table 8 Here

Hypothesis 2 (e) used betweenness centrality as the dependent variable. Betweenness centrality describes how likely an actor locates in between of two actors and plays the role as an intermediate agency (Wasserman & Faust, 1994). For this study, the average betweenness centrality was 148.862 ($SD=794.546$). As can be seen from Figure 9, the differences among nodes were large on this measure. Figure 8 showed that the majority of the nodes had relatively small betweenness centrality, and a few nodes in the center had exceptionally large betweenness centrality.

Insert Figure 9 Here

For betweenness centrality (See Table 9 for details), in Model 9_1, and all subsequent models, each cell reported the unstandardized coefficient with the unstandard error in parentheses. H2 (e) predicted that global civil actors' network positions as measured by betweenness centrality were significantly predicted by the world system positions of the civil actors' country-of-origin (as measured by information society index). An OLS regression was performed, H2 (e) was rejected. R for regression was not significantly different from zero $F(1, 428) = 1.194, n. s.$, with $R^2 = .003$, and adjusted $R^2 = .000$. Only about 0.3% of variance in betweenness centrality can be explained by the world system position of an organization's country-of-origin.

In Model 9_2, the effect of world system positions on betweenness centrality was tested. In this model, H2 (d) was rejected. R for regression was not significantly different from zero $F(2, 445) = .374, n. s.$, with $R^2 = .002$, and adjusted $R^2 = .000$.

Insert Table 9 Here

In sum, it seems network measures of individual organizational websites' centrality were not sensitive to the world system position of each organization's country-of-origin. Together, these findings imply that world system position cannot powerfully influence individual organizations' online network position. For example, whether an INGO is a prestigious organization or if it is willing to initiate a large number of connections is not significantly determined by the world system position of the organization's country-of-origin.

Research question 2. First, in order to refresh the readers' memory, research question 2 was restated as following:

RQ2: What is the relationship between an environmental INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the economic development level of the organization's country-of-origin?

The independent variable was the economic development level of each organization's country-of-origin. Among the 86 countries from which the 509 environmental INGOs originated, the average of GNI per capita was 36,773.76 ($SD=19,177.29$) US Dollars. This finding suggested that most environmental INGOs originated from wealthy countries. However, the large standard deviation revealed a large international inequality among nations, with countries such as Norway (\$84,640), Switzerland (\$65,430) and Denmark (\$59,060) on one end of the spectrum, and countries such as Sierra Leone (\$340), Malawi (\$290) and Congo (\$160) on the other end. In order to reduce the skewness of the data, GNI per capita was logged before the analysis.

Model 5_3 tested the effect of countries' economic development level on indegree centrality (See Table 4 for details). Research question 2 asked about the relationship between an INGO's virtual network position (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the economic development level of the organization's country-of-origin. In terms of indegree centrality, the finding suggested that a country's economic development level may not have a large impact on an organizational website's indegree. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(1, 434) = .715, n. s.$, with $R^2 = .002$, and adjusted $R^2 = .000$. Only about 0.2% of

variance in indegree centrality can be explained by the economic development level of an organization's country-of-origin.

Model 6_3 tested the effect of countries' economic development level on outdegree centrality (See Table 5 for details). Research question 2 asked about the relationship between an INGO's virtual network position (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the economic development level of the organization's country-of-origin. In terms of outdegree centrality, the finding suggested that a country's economic development level may not have a large impact on an organizational website's outdegree. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(1, 434) = 1.679, n. s.$, with $R^2 = .004$, and adjusted $R^2 = .002$. Only about 0.4% of variance in outdegree centrality can be explained by the economic development level of an organization's country-of-origin.

Model 7_3 tested the effect of countries' economic development level on incoming ties closeness centrality (See Table 6 for details). Research question 2 asked about the relationship between an INGO's virtual network position (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the economic development level of the organization's country-of-origin. In terms of (incoming ties) closeness centrality, the finding suggested that a country's economic development level may not have a large impact on an organizational website's (incoming ties) closeness centrality. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(1, 435) = 2.738, n.s.$, with $R^2 = .006$, and adjusted $R^2 = .004$. Only about 0.6% of variance in (incoming

ties) closeness centrality can be explained by the economic development level of an organization's country-of-origin.

Model 8_3 tested the effect of countries' economic development level on outgoing ties closeness centrality (See Table 7 for details). Research question 2 asked about the relationship between an INGO's virtual network position (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the economic development level of the organization's country-of-origin. In terms of (outgoing ties) closeness centrality, the finding suggested that a country's economic development level may not have a large impact on an organizational website's (outgoing ties) closeness centrality. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(1, 435) = 2.663$, *n.s.*, with $R^2 = .006$, and adjusted $R^2 = .004$. Only about 0.6% of variance in (outgoing ties) closeness centrality can be explained by the economic development level of an organization's country-of-origin.

Model 9_3 tested the effect of countries' economic development level on betweenness centrality (See Table 8 for details). Research question 2 asked about the relationship between an INGO's virtual network position (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the economic development level of the organization's country-of-origin. In terms of betweenness centrality, the finding suggested that a country's economic development level may not have a large impact on an organizational website's betweenness centrality. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(1, 435) = .717$, *n. s.*, with $R^2 = .002$, and adjusted $R^2 = .000$. Only

about 0.2% of variance in betweenness centrality can be explained by the economic development level of an organization's country-of-origin.

Research question 3. First, in order to refresh the readers' memory of research question 3 were restated as following:

RQ3: What is the relationship between an environmental INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the democracy level of the organization's country-of-origin?

The independent variable was the democracy level of each organization's country-of-origin. Among the 86 countries from which the 509 INGOs originated, the mean value for countries' democracy level was 8.80 ($SD=2.83$). This finding suggested that most INGOs originated from countries with well developed democracy systems.

Model 5_4 tested the effect of countries' democracy level on indegree centrality (See Table 4 for details). Research question 3 directs attention to the relationship between an INGO's virtual network position (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the democracy level of the organization's country-of-origin. In terms of indegree centrality, the finding suggested that a country's democracy level may not have a large impact on an organizational website's indegree. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(1, 439) = .457, n. s.$, with $R^2 = .001$, and adjusted $R^2 = .000$. Only about 0.1% of variance in indegree centrality can be explained by the democracy level of an organization's country-of-origin.

Model 6_4 tested the effect of countries' democracy level on outdegree centrality (See Table 5 for details). Research question 3 directs attention to the relationship between an INGO's virtual network position (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the democracy level of the organization's country-of-origin. In terms of outdegree centrality, the finding suggested that a country's democracy level may not have a large impact on an organizational website's outdegree. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(1, 439) = .073, n. s.$, with $R^2 = .000$, and adjusted $R^2 = .000$. Only about less than 0.1% of variance in outdegree centrality can be explained by the democracy level of an organization's country-of-origin.

Model 7_4 tested the effect of countries' democracy level on incoming ties closeness centrality (See Table 6 for details). Research question 3 directs attention to the relationship between an INGO's virtual network position (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the democracy level of the organization's country-of-origin. In terms of (incoming ties) closeness centrality, the finding suggested that a country's democracy level may not have a large impact on an organizational website's (incoming ties) closeness centrality. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(1, 440) = .010, n. s.$, with $R^2 = .000$, and adjusted $R^2 = .000$. Only about less than 0.1% of variance in (incoming ties) closeness centrality can be explained by the democracy level of an organization's country-of-origin.

Model 8_4 tested the effect of countries' democracy level on outgoing ties closeness centrality (See Table 7 for details). Research question 3 directs attention to the relationship between an INGO's virtual network position (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the democracy level of the organization's country-of-origin. In terms of (incoming ties) closeness centrality, the finding suggested that a country's democracy level may not have a large impact on an organizational website's (incoming ties) closeness centrality. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(1, 440) = 1.237, n. s.$, with $R^2 = .003$, and adjusted $R^2 = .001$. Only about less than 0.3% of variance in (outgoing ties) closeness centrality can be explained by the democracy level of an organization's country-of-origin.

Model 9_4 tested the effect of countries' democracy level on betweenness centrality (See Table 8 for details). Research question 3 directs attention to the relationship between an INGO's virtual network position (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the democracy level of the organization's country-of-origin. In terms of betweenness centrality, the finding suggested that a country's democracy level may not have a large impact on an organizational website's betweenness centrality. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(1, 440) = .884, n. s.$, with $R^2 = .002$, and adjusted $R^2 = .000$. Only about less than 0.2% of variance in betweenness centrality can be explained by the democracy level of an organization's country-of-origin.

Hypothesis 3 (a & b). First, in order to refresh the readers' memory of the two hypotheses, hypothesis 3 (a & b) were restated as following:

H3a: The numbers of visitors to environmental INGOs' websites are significantly influenced by the world system position of environmental INGOs' countries-of-origin.

H3b: The numbers of followers to environmental INGOs' Facebook accounts are significantly influenced by the world system position of environmental INGOs' countries-of-origin.

Model 10_1 tested the effect of countries' world system positions (measured by ISPI) on number of visitors to INGOs' websites (See Table 10 for details). The finding suggested that countries' world system positions may not have a large impact on an organizational website's number of visitors. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(1, 349) = .027, n. s.$, with $R^2 = .000$, and adjusted $R^2 = .000$. Only about less than 0.01% of variance in the number of visitors to INGOs' websites can be explained by the world system positions of these organizations' countries-of-origin.

Model 10_2 tested the effect of countries' world system positions on number of visitors to INGOs' websites (See Table 9 for details). The finding suggested that countries' world system positions may not have a large impact on an organizational website's number of visitors. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(2, 365) = .570, n. s.$, with $R^2 = .003$, and adjusted $R^2 = .000$. Only about less than 0.3% of variance in the number of

visitors to INGOs' websites can be explained by the world system positions of organizations' country-of-origin.

In conclusion, H3a was rejected by the finding and it seems that countries' world system positions did not significantly affect the number of visitors each website can attract.

Insert Table 10 Here

Model 11_1 tested the effect of countries' world system positions (measured by ISPI) on the number of followers to INGOs' Facebook account (See Table 11 for details). The finding suggested that countries' world system positions may not have a large impact on an organizational website's number of visitors. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(1, 155) = .337, n. s.$, with $R^2 = .002$, and adjusted $R^2 = .000$. Only about 0.1% of variance in the number of followers to INGOs' Facebook account can be explained by the world system position of an organization's country-of-origin.

Insert Table 11 Here

Model 11_2 tested the effect of countries' world system positions on the number of followers to INGOs' Facebook account (See Table 11 for details). The finding suggested that countries' world system positions may not have a large impact on the number of followers to INGOs' Facebook account. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(2, 157) = .089, n. s.$, with $R^2 = .001$, and adjusted $R^2 = .000$. Only about less than 0.1% of variance in the number of followers to INGOs' Facebook account can be explained by the world system positions of an organization's country-of-origin. Interestingly, the

coefficients of semi-peripheral and peripheral countries were both negative, suggesting that INGOs originated from these countries had relatively less Facebook followers than INGOs from core countries. Nevertheless, the effect was not significant.

In conclusion, H3b was rejected by the finding and it seems that countries' world system positions did not significantly affect the number of followers to each INGO's Facebook account. Further, findings indicated that although not significant, INGOs originated from core countries tend to have more Facebook followers than INGOs originated from semi-peripheral and peripheral countries.

Research question 4. First, RQ4 was restated as following:

RQ4: What is the relationship between an environmental INGO's virtual network component structure and the world system positions of the organization's country-of-origin?

As one of the most interesting types of SNA, structural analysis of substructures or sub-groups helps to reveal the underlying structure of a network. To answer this research question, a component analysis was conducted first to identify substructures of the network.

In social network analysis, there were many different approaches to identify subgroups in a network. This study used *k*-cores to identify subgroups in the network. The *k*-cores approach is a degree based method to identify cohesive subgroups (Seidman, 1983). A *k*-core is a subgroup in which each node is adjacent to at least a minimum of *k* nodes in this subgroup. By using *k*-cores, the analysis identified 11 *k*-cores within this network (See Figure 10 for details). In Figure 10, the 11 *k*-cores were designated with 11 different colors and shapes. Next, a variable, *k*-cores membership

was created to see if it was significantly affected by the world system position of each organization's country-of-origin.

Insert Figure 10 Here

Next, to examine if world system position was a driven force of how INGOs cluster together, a regression analysis was conducted to examine if countries' world system positions were powerful predictor of organizations' *k*-cores memberships.

To use organizations' *k*-cores memberships as the dependent variable, it is necessary to consider the variable as an unordered categorical and multinomial variable. Therefore, the nature of this dependent variable suggests the use of a multinomial logistic model. A multinomial logistic model is in fact a collection of models. Since there were 11 categories in the dependent variable, there were 10 logistic models involved in the analysis. Each model was used to predict the probability of a given category on the basis of information of the independent variable. The significance of a model can be tested by using the *Chi-Square* Statistics. A significant result indicates that the model is significant (Rubinfeld, 1982). The same method of model testing for *k*-cores was used throughout the project for other sequential independent variables. In this project, *k*-core 11 was used as the referential group.

Model 12_1 tested the effect of countries' world system positions (measured by ISPI) on INGOs' *k*-cores membership (See Table 12 for details). The finding suggested that countries' world system positions may not have a large impact on an organizational *k*-core membership, *Chi-Square*=341.985(*df*=638, *n.s.*).

Insert Table 12 Here

Further, to test the effect of countries' world system positions on INGOs' *k*-cores membership, another multinomial logistic regression was performed. The finding suggested that countries' world system positions may not have a large impact on an organizational website's number of visitors. The overall *Chi-Square*=31.395(*df*=22, *n.s.*). None of the world system position categories achieved significant effect.

In conclusion, to answer RQ4, the finding suggested that INGOs' clustering pattern was not significantly affected by organizations' countries-of-origin.

Finally, the analysis showed that World System Theory is especially powerful with the structural feature of INGOs. It was found that world system positions can significantly predict INGOs' coreness and INGOs' clustering pattern. World system positions also influence INGOs' outdegree centrality and (incoming ties) closeness centrality. However, for other measures of INGOs' network positions, world system positions and countries' economic and political context had little influence.

World Polity Theory Related Findings

World Polity Theory is an institutionalist approach to understand international relationships and the influence of international organizations on behaviors of nations (Boli & Thomas, 1997, 1999). This section presented findings of research questions and hypotheses that were derived from World Polity Theory.

Research question 5. First, in order to refresh the readers' memory of research question 5, it was restated as following:

RQ5: What is the relationship between an environmental INGO's virtual network centrality (as measured by indegree centrality, outdegree

centrality, closeness centrality and betweenness) and the civilization type of the organization's country-of-origin?

The independent variable of this question was countries' civilization types.

World Polity Theory emphasizes the influence of culture on world polity ties (Meyer et al., 1997). In this study, Western culture (73.3%) represented the largest percentage of culture types in this sample. In other words, most INGOs originated from countries that are dominated by Western culture. Following Western culture, countries with Latin American culture (4.3%), African culture (3.8%) and Islamic culture (3.8%) are the next major originating countries of INGOs. In contrast, countries dominated by the Sinic culture (0.8%) are the least likely originating places for an INGO.

Model 13_2 tested the effect of civilization types on indegree centrality (See Table 13 for details). Research question 4 asked about the relationship between an INGO's virtual network position (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the civilization types of the organization's country-of-origin. In terms of indegree centrality, the finding suggested that a country's civilization level may not have a large impact on an organizational website's indegree. A standard multiple regression was performed, and it was found that R for regression was not significantly different from zero $F(9, 438) = 1.210, n. s.$, with $R^2 = .024$, and adjusted $R^2 = .004$. About 2.4 % of variance in indegree centrality can be explained by the civilization types of an organization's country-of-origin. Interestingly, the effect of "Other" cultural type was significant, unstandardized coefficient = 4.120, $t(438) = 2.097, p < .05$. In other words, in comparison to Western culture, organizations originated from the "Other" culture type are more likely to have higher indegree.

Insert Table 13 Here

Model 14_2 tested the effect of civilization types on outdegree centrality (See Table 14 for details). Research question 4 asked about the relationship between an INGO's virtual network position (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the civilization types of the organization's country-of-origin. In terms of indegree centrality, the finding suggested that a country's civilization level did have a statistically significant impact on an organizational website's outdegree. A standard multiple regression was performed, and it was found that R for regression was significantly different from zero $F(9, 438) = 2.246, p < .01$, with $R^2 = .044$, and adjusted $R^2 = .024$. About 4.4 % of variance in outdegree centrality can be explained by the civilization types of an organization's country-of-origin. Interestingly, the effect of African culture was significant, unstandardized coefficient = 34.77, $t(438) = 4.214, p < .001$. The coefficient suggested that organizations originating from African culture are, on average, have outdegree centrality that was 34.77 larger than organizations originated from Western countries. Since outdegree centrality captured an organization's eagerness to develop relationships with others, this finding may suggest that organizations originated from countries with African culture are more eager to develop relationship with others.

Insert Table 14 Here

Model 14_2 tested the effect of civilization types on (incoming ties) closeness centrality (See Table 6 for details). Research question 4 asked about the relationship between an INGO's virtual network position (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the civilization types of

the organization's country-of-origin. In terms of (incoming ties) closeness centrality, the finding suggested that a country's civilization level may not have a statistically significant impact on an organizational website's (incoming ties) closeness centrality. A standard multiple regression was performed, and it was found that R for regression was not significantly different from zero $F(9, 439) = .627, n. s.$, with $R^2 = .013$, and adjusted $R^2 = .008$. About 1.3 % of variance in (incoming ties) closeness centrality can be explained by the civilization types of an organization's country-of-origin.

Insert Table 14 Here

Model 15_2 tested the effect of civilization types on (outgoing ties) closeness centrality (See Table 15 for details). Research question 4 asked about the relationship between an INGO's virtual network position (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the civilization types of the organization's country-of-origin. In terms of (incoming ties) closeness centrality, the finding suggested that a country's civilization level may not have a statistically significant impact on an organizational website's (outgoing ties) closeness centrality. A standard multiple regression was performed, and it was found that R for regression was not significantly different from zero $F(9, 439) = .780, n. s.$, with $R^2 = .016$, and adjusted $R^2 = .004$. About 1.6 % of variance in (outgoing ties) closeness centrality can be explained by the civilization types of an organization's country-of-origin.

Insert Table 15 Here

Model 16_2 tested the effect of civilization types on betweenness centrality (See Table 8 for details). Research question 4 asked about the relationship between an INGO's virtual network position (as measured by indegree centrality, outdegree

centrality, closeness centrality and betweenness) and the civilization types of the organization's country-of-origin. In terms of betweenness centrality, the finding suggested that a country's civilization level may not have a statistically significant impact on an organizational website's (incoming ties) closeness centrality. A standard multiple regression was performed, and it was found that R for regression was not significantly different from zero $F(9, 439) = .342, n. s.$, with $R^2 = .007$, and adjusted $R^2 = .004$. About 0.7 % of variance in betweenness centrality can be explained by the civilization types of an organization's country-of-origin.

Insert Table 16 Here

In conclusion, to answer research question 5, the analysis found that an INGO's virtual network centrality as measured by indegree centrality, outdegree centrality are influenced by the civilization type of the organization's country-of-origin. Specifically, INGOs originating from African culture are more likely to initiate ties. This phenomenon may be due to the fact that a lot of African countries have limited social resource for environmental protection while they have many precious animal species and original forests that need protection. The sharp contrast between limited resource and enormous responsibility pressed these INGOs eagerly seeking cooperation opportunities. However, cultural types had little influence over INGOs' closeness centrality and betweenness.

Hypothesis 4. First, in order to refresh the readers' memory of research hypothesis 4 are restated as following:

H4: The component structure of the environmental INGOs' network is significantly influenced by the civilization types of environmental INGOs' countries-of-origin.

To test the effect of civilization types on the component structure of INGOs' network, a multinomial logistic regression was performed. *H4* predicted that the component structure of the INGOs' network was significantly influenced by the civilization types of INGOs' countries-of-origin. It was found *Chi-Square*=68.460 (*df*=99, *n.s.*). The overall model is not significant. Nevertheless, a close examination suggest that for k-core #1, organizations with Hindu culture are more likely to participate this group (the unstandardized coefficient=4.183, $p < .05$). INGOs with Orthodox culture are more likely to participate in k-core #2 (the unstandardized coefficient=4.190, $p < .05$). INGOs with Islamic culture are more likely to participate in k-core #3 (the unstandardized coefficient=3.519, $p < .05$). Therefore, H4 was supported.

Research question 6. First, in order to refresh the readers' memory, research question 6 was restated as following:

RQ6: What is the relationship between an environmental INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the world polity ties of the organization's country-of-origin?

Model 13_1 tested effect of countries' world polity ties on indegree centrality (See Table 13 for details). The finding suggested that a country's world polity ties may not have a large impact on an organizational website's indegree. An OLS regression was performed, and it was found that *R* for regression was not significantly different

from zero $F(1, 447) = .014$, *n. s.*, with $R^2 = .000$, and adjusted $R^2 = .000$. Only about less than 0.01% of variance in indegree centrality can be explained by countries' world polity ties.

Model 14_1 tested the effect of countries' world polity ties on outdegree centrality (See Table 14 for details). The finding suggested that a country's democracy level may not have a large impact on an organizational website's outdegree. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(1, 447) = 2.084$, *n. s.*, with $R^2 = .005$, and adjusted $R^2 = .002$. Only about 0.5% of variance in outdegree centrality can be explained by countries' world polity ties.

Model 15_1 tested the effect of countries' world polity ties on incoming ties closeness centrality (See Table 15 for details). The finding suggested that a country's world polity ties may not have a large impact on an organizational website's (incoming ties) closeness centrality. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(1, 448) = .577$, *n. s.*, with $R^2 = .001$, and adjusted $R^2 = .000$. Only about 0.1% of variance in (incoming ties) closeness centrality can be explained by countries' world polity ties.

Model 16_1 tested the effect of countries' world polity ties on outgoing ties closeness centrality (See Table 16 for details). The finding suggested that a country's world polity tie may not have a large impact on an organizational website's (outgoing ties) closeness centrality. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(1, 448) = .105$, *n. s.*, with $R^2 = .000$,

and adjusted $R^2=.000$. Only about less than 0.01% of variance in (outgoing ties) closeness centrality can be explained by the countries' world polity ties.

Model 17_1 tested the effect of countries' world polity ties on betweenness centrality (See Table 17 for details). The finding suggested that a country's world polity tie may not have a large impact on an organizational website's betweenness centrality. An OLS regression was performed, and it was found that R for regression was not significantly different from zero $F(1, 448) = 1.722, n. s.$, with $R^2 = .004$, and adjusted $R^2=.002$. Only about 0.4% of variance in betweenness centrality can be explained by the countries' world polity ties.

Hypothesis 5 (a &b). First, in order to refresh the readers' memory of Hypothesis 5 (a &b) was restated as following:

H5a: The websites of environmental INGOs originated from countries with dense world polity ties have more visitors than websites of environmental INGOs originated from countries with sparse world polity ties.

H5b: Facebook accounts of environmental INGOs originated from countries with dense world polity ties have more followers than Facebook accounts of environmental INGOs originated from countries with sparse world polity ties.

Model 10_3 tested the effect of world polity ties on the number of visitors these websites can attract. H6a was rejected based on the finding. R for regression was not significantly different from zero $F(1, 368) = .073, n. s.$, with $R^2 = .000$, and adjusted $R^2=.000$. Only about less than 0.01% of variance in number of website visitors can be explained by the countries' world polity ties.

Model 11_3 tested the effect of world polity ties on the number of Facebook followers each organizational Facebook account can attract. H6a was rejected based on the finding. R for regression was not significantly different from zero $F(1, 158) = .113$, $n. s.$, with $R^2 = .001$, and adjusted $R^2 = .000$. Only about 0.1% of variance in number of Facebook followers can be explained by the countries' world polity ties.

In sum, this section tested the effect of two World Polity Theory predictors: culture and world polity ties. For culture, this study found that in comparison to Western culture, organizations originated from the "Other" culture type are more likely to have higher indegree. Since outdegree centrality captured an organization's eagerness to develop relationships with others, this finding may suggest that organizations originated from countries with African culture are more eager to develop relationship with others. However, cultural type is not a significant predictor of INGOs' incoming and outgoing ties closeness centrality, and it has no significant influence over INGOs' betweenness centrality. Cultural type also did not influence the component structure of INGOs' network.

Similarly, world polity ties had little impact on INGOs' network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness). World polity ties also were not a significant predictor on the number of website visitors and the number of Facebook followers. These findings suggest that although studies found world polity ties have significant influence on nation states, the effect may not be significant on INGOs' network structure. The next section introduced network society related findings.

Network Society Related Findings

According to Castells (2008), in the network society, the effective organization and exercise of power and collective actions requires an effective utilization of networked communication. Networks are formed around shared meanings and identities, and networks also impose constraints or opportunities on the networked communication. The nature of the messages being communicated and the nature of the networked medium (the Internet in the current context) both have an impact on the communication structure. This section presented findings of research questions and hypotheses that were derived from the discussion of network society.

Research question 7. First, in order to refresh the readers' memory, research question 7 was restated as following:

RQ7: What is the relationship between an environmental INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the environmental INGO's issue area?

To examine the relationship between indegree centrality and an environmental INGO's issue area (See Table 18 Model 18_1 for details), a standard multiple regression was performed. It was found that R for regression was significantly different from zero $F(13, 438) = 1.650, p < .05$, with $R^2 = .047$, and adjusted $R^2 = .018$. About 4.7% of variance in indegree centrality can be explained by the issue areas of an INGO. Issue 11 (*Research and Information Sharing*) was the reference group because the largest number of INGOs focusing on this issue area. Specifically, the effect of Issue 2 (*Biodiversity*) was significant, unstandardized coefficient = 7.981, $t(438) = 3.494, p < .001$.

The coefficient suggested that organizations focusing on Issue 2 were, on average, had indegree centrality that was 7.981 larger than organizations focusing on Issue 11 (*Research and Information Sharing*). Further, the effect of Issue 12 (*Promoting Local and Global Connection and Networks*) was significant, unstandardized coefficient=3.514, $t(438) = 2.235$, $p < .05$. The coefficient suggested that organizations focusing on Issue 12 (*Promoting Local and Global Connection and Networks*) were, on average, had indegree centrality that was 3.514 larger than organizations focusing on Issue 11 (*Research and Information Sharing*). Finally, the effect of Issue 14 (*Mixed Aims*) was also significant, unstandardized coefficient=11.523, $t(438) = 2.778$, $p < .01$. The coefficient suggested that organizations focusing on Issue 14 (*Mixed Aims*) were, on average, had indegree centrality that was 11.523 larger than organizations focusing on Issue 11 (*Research and Information Sharing*).

Insert Table 18 Here

To examine the relationship between outdegree centrality and an environmental INGO's issue area (See Table 19, Model 19_1 for details), a standard multiple regression was performed. It was found that R for regression was not significantly different from zero $F(13, 438) = .789$, $n. s.$, with $R^2 = .023$, and adjusted $R^2 = .006$. About 2.3% of variance in outdegree centrality can be explained by the issue areas of an INGO. Specifically, the effect of Issue 2 (*Biodiversity*) was significant, unstandardized coefficient=20.282, $t(438) = 2.385$, $p < .01$. The coefficient suggested that organizations focusing on Issue 2 were, on average, had outdegree centrality that was 20.282 larger than organizations focusing on Issue 11.

Insert Table 19 Here

To examine the relationship between (incoming ties) closeness centrality and an environmental INGO's issue area (See Table 20 Model 20_1 for details), a standard multiple regression was performed. It was found that R for regression was not significantly different from zero $F(13, 439) = 1.607, n. s.$, with $R^2 = .045$, and adjusted $R^2 = .017$. About 4.5% of variance in (incoming ties) closeness centrality can be explained by the issue areas of an INGO. Specifically, the effect of Issue 1 was significant, unstandardized coefficient = .019, $t(439) = 2.120, p < .05$. The coefficient suggested that organizations focusing on Issue 1 (*Sustainable Development*) were, on average, (incoming ties) closeness centrality that was .019 larger than organizations focusing on Issue 11. Further, the effect of Issue 5 (*Climate Change*) was significant, unstandardized coefficient = .030, $t(438) = 2.100, p < .05$. The coefficient suggested that organizations focusing on Issue 5 were, on average, had (incoming ties) closeness centrality that was .03 larger than organizations focusing on Issue 11. Next, the effect of Issue 8 (*Water Resource*) was significant, unstandardized coefficient = .025, $t(438) = 2.602, p < .01$. The coefficient suggested that organizations focusing on Issue 8 were, on average, had (incoming ties) closeness centrality that was .025 larger than organizations focusing on Issue 11. Further, the effect of Issue 13 (*Grant Foundations*) was also significant, unstandardized coefficient = .042, $t(438) = 2.566, p < .01$. The coefficient suggested that organizations focusing on Issue 13 were, on average, had (incoming ties) closeness centrality that was .042 larger than organizations focusing on Issue 11. Finally, the effect of Issue 14 was also significant, unstandardized coefficient = .054, $t(438) = 2.116, p < .05$. The coefficient suggested that organizations focusing on Issue 14 (*Mixed aims*) were, on average, had (incoming ties) closeness

centrality that was .054 larger than organizations focusing on Issue 11. It is possible that INGOs with mixed aims are more close to other types of INGOs because of the overlapping of focuses.

Insert Table 20 Here

To examine the relationship between (outgoing ties) closeness centrality and an environmental INGO's issue area (See Table 21 Model 21_1 for details), a standard multiple regression was performed. It was found that R for regression was not significantly different from zero $F(13, 439) = 1.601, n. s.$, with $R^2 = .045$, and adjusted $R^2 = .017$. About 4.5% of variance in (outgoing ties) closeness centrality can be explained by the issue areas of an INGO. Specifically, the effect of Issue 9 (*Waste Procession, Recycling, Controlling of Pollution*) was significant, unstandardized coefficient = .040, $t(439) = 1.920, p < .05$. The coefficient suggested that organizations focusing on Issue 9 were, on average, had (outgoing ties) closeness centrality that was .040 larger than organizations focusing on Issue 11. Finally, the effect of Issue 12 (*Promoting Local and Global Connection and Networks*) was significant, unstandardized coefficient = .028, $t(439) = 1.935, p < .05$. The coefficient suggested that organizations focusing on Issue 12 were, on average, had (outgoing ties) closeness centrality that was .028 larger than organizations focusing on Issue 11.

Insert Table 21 Here

To examine the relationship between betweenness centrality and an environmental INGO's issue area (See Table 22 Model 22_1 for details), a standard multiple regression was performed. It was found that R for regression was significantly different from zero $F(13, 439) = 3.261, p < .001$, with $R^2 = .088$, and adjusted $R^2 = .061$.

About 8.8% of variance in betweenness centrality can be explained by the issue areas of an INGO. Specifically, the effect of Issue 2 was significant, unstandardized coefficient= 1002.726, $t(439) = 5.147$, $p < .001$. The coefficient suggested that organizations focusing on Issue 2 (*Biodiversity*) were, on average, had betweenness centrality that was 1002.726 larger than organizations focusing on Issue 11. Finally, the effect of Issue 14 (*Mixed Aims*) was significant, unstandardized coefficient= 1226.130, $t(439) = 3.463$, $p < .001$. The coefficient suggested that organizations focusing on Issue 2 were, on average, had betweenness centrality that was 1226.130 larger than organizations focusing on Issue 11.

Insert Table 22 Here

In sum, to answer research question 6, INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) was significantly influenced by each INGO's issue area. Specifically, INGOs focusing on biodiversity, promoting local and global connection and networks, and organizations with mixed aims had on average, indegree centrality that was larger than organizations focusing on research and information sharing. For outdegree centrality, INGOs' issue areas were also a significant predictor. Organizations focusing on biodiversity, on average, had outdegree centrality that was larger than organizations focusing on research and information sharing. For incoming ties centrality, the study found that organizations focusing on sustainable development, climate change, water resource, grant foundations, and mixed aims, on average, had (incoming ties) closeness centralities that were larger than organizations focusing on research and information sharing.

For outgoing ties closeness centrality, organizations focusing on waste procession, recycling, controlling of pollution and promoting local and global connection and networks, on average, had (incoming ties) closeness centralities that were larger than organizations focusing on research and information sharing. For betweenness centrality, organizations focusing on biodiversity and with mixed aims, on average, had betweenness centralities that were larger than organizations focusing on research and information sharing.

Research question 8. First, in order to refresh the readers' memory, research question 8 was restated as following:

RQ8: What is the relationship between an environmental INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the INGO's years of operation?

To examine the relationship between indegree centrality and an environmental INGO's years of operation (See Table 18 Model 18_2 for details), a standard multiple regression was performed. It was found that R for regression was significantly different from zero $F(1, 426) = 6.812, p < .01$, with $R^2 = .016$, and adjusted $R^2 = .013$. About 1.6% of variance in indegree centrality can be explained by the years of operation of an INGO. Specifically, the unstandardized coefficient = .068, $t(426) = 2.610, p < .01$. The coefficient suggested that for every 1 more year staying in operation, organizations tend to had indegree centrality that was .068 larger.

To examine the relationship between outdegree centrality and an environmental INGO's years of operation (See Table 18 Model 18_2 for details), a standard multiple

regression was performed. It was found that R for regression was not significantly different from zero $F(1, 426) = .002, p < .01$, with $R^2 = .000$, and adjusted $R^2 = .000$. Less than about .01% of variance in outdegree centrality can be explained by the years of operation of an INGO. In other words, INGOs with different length of histories did not show significant difference in their outdegree centrality.

To examine the relationship between (incoming ties) closeness centrality and an environmental INGO's years of operation (See Table 20 Model 20_2 for details), a standard multiple regression was performed. It was found that R for regression was significantly different from zero $F(1, 427) = 4.012, p < .05$, with $R^2 = .009$, and adjusted $R^2 = .007$. About 0.9% of variance in (incoming ties) closeness centrality can be explained by the years of operation of an INGO. Specifically, the unstandardized coefficient = .000, $t(427) = 2.003, p < .05$. The coefficient suggested that for every 1 more year staying in operation, organizations tend to have incoming ties closeness centrality that was slightly larger.

To examine the relationship between (outgoing ties) closeness centrality and an environmental INGO's years of operation (See Table 21 Model 21_2 for details), a standard multiple regression was performed. It was found that R for regression was not significantly different from zero $F(1, 427) = .553, n.s.$, with $R^2 = .001$, and adjusted $R^2 = .000$. About 0.1% of variance in (outgoing ties) closeness centrality can be explained by the years of operation of an INGO. In other words, INGOs with different length of histories did not show significant difference in their (outgoing ties) closeness centrality.

Finally, to examine the relationship between betweenness centrality and an environmental INGO's years of operation (See Table 22 Model 22_2 for details), a standard multiple regression was performed. It was found that R for regression was not significantly different from zero $F(1, 427) = 2.906, n. s.$, with $R^2 = .007$, and adjusted $R^2 = .004$. About 0.7% of variance in betweenness centrality can be explained by the years of operation of an INGO. In other words, INGOs with different length of histories did not show significant difference in their betweenness centrality.

In sum, organizations' years of operation did significantly affect an INGO's virtual network centrality. The effect was especially significant on INGOs' indegree centrality and incoming ties closeness centrality.

Research question 9. First, in order to refresh the readers' memory, research question 9 was restated as following:

RQ9: What is the relationship between an environmental INGO's number of website visitors and its issue area?

To examine the relationship between an environmental INGO's number of website visitors and its issue area (See Table 23 Model 23_1 for details), a standard multiple regression was performed. It was found that R for regression was not significantly different from zero $F(13, 359) = 1.618, n. s.$, with $R^2 = .055$, and adjusted $R^2 = .021$. About 5.5% of variance in the number of website visitors can be explained by the issue areas of an INGO. Specifically, the effect of Issue 1 was significant, unstandardized coefficient = $-.007, t(359) = -1.992, p < .05$. The coefficient suggested that organizations focusing on *Sustainable Development* were, on average, had website visitors that were .007% (out of the total global Internet users) less than organizations

focusing on Issue 11. Finally, the effect of Issue 3 (*Animal Rights*) was also significant, unstandardized coefficient=-.007, $t(359) = -2.050$, $p < .05$. The coefficient suggested that organizations focusing on Issue 1 were, on average, had website visitors that were .007% (out of the total global Internet users) less than organizations focusing on Issue 11.

Insert Table 23 Here

Therefore, to answer RQ8, INGOs' issue areas did have a significant impact on the number of website visitors an INGO can draw. For specifically, it seems organizations focusing on issue 1 (*Sustainable Development*) and 3 (*Animal Rights*) tend to have much fewer visitors than organizations focusing on issue 11.

Research question 10. First, in order to refresh the readers' memory, research question 10 was restated as following:

RQ10: What is the relationship between an environmental INGO's number of Facebook Followers and the INGO's issue area?

To examine the relationship between an environmental INGO's number of Facebook followers and its issue area (See Table 24 Model 24_1 for details), a standard multiple regression was performed. It was found that R for regression was not significantly different from zero $F(13, 145) = 1.618$, $n. s.$, with $R^2 = .047$, and adjusted $R^2 = .039$. About 4.7% of variance in the number of Facebook followers can be explained by the issue areas of an INGO. Specifically, the effect of Issue 3 (*Animal Rights*) was significant, unstandardized coefficient=34340.898, $t(145) = 2.242$, $p < .05$. The coefficient suggested that organizations focusing on Issue 3 were, on average, had Facebook followers that were about 34341 more than organizations focusing on Issue 11 (*Research & Information Sharing*).

Insert Table 24 Here

Therefore, to answer RQ9, INGOs' issue areas did have a significant impact on the number of Facebook followers that an INGO can draw. Specifically, it seems organizations focusing on issue 3 (*Animal Rights*) tend to have much more Facebook followers than organizations focusing on issue 11 (*Research & Information Sharing*). This finding suggested that animal rights INGOs enjoyed the advantage of being able to appeal to Facebook user. Given the current trend that millions are adopting Facebook, animal rights INGOs may consider further use Facebook (and other social media) to mobilize support.

Research question 11. First, in order to refresh the readers' memory, research question 11 was restated as following:

RQ11: What is the relationship between the Internet connectivity of an environmental INGO's country-of-origin and the INGO's number of website visitors?

To examine the relationship between an environmental INGO's number of website visitors and the Internet connectivity of its country-of-origin (See Table 23 Model 23_2 for details), a standard multiple regression was performed. It was found that R for regression was not significantly different from zero $F(1, 358) = .386, n.s.$, with $R^2 = .001$, and adjusted $R^2 = .000$. About 0.1 % of variance in the number of website visitors can be explained by the Internet connectivity of an environmental INGO's country-of-origin.

Research question 12. First, in order to refresh the readers' memory, research question 12 was restated as following:

RQ12: What is the relationship between the Internet connectivity of an environmental INGO's country-of-origin and the INGO's number of Facebook followers?

To examine the relationship between an environmental INGO's number of Facebook followers and the Internet connectivity of its country-of-origin (See Table 24 Model 24_2 for details), a standard multiple regression was performed. It was found that R for regression was not significantly different from zero $F(1, 156) = .478, n.s.$, with $R^2 = .003$, and adjusted $R^2 = .000$. About 0.3 % of variance in the number of Facebook followers can be explained by the Internet connectivity of an INGO's country-of-origin.

Hypothesis 6. First, in order to refresh the readers' memory, Hypothesis 6 was restated as following:

H6: The component structure of environmental INGOs' virtual network is significantly influenced by environmental INGOs' issue areas.

To examine the relationship between an environmental INGO's issue areas and its *k*-cores membership, a multinomial logistic regression was performed. It was found that the overall *Chi-Square* = 78.335 ($df=143, n.s.$). None of the issue areas significantly influenced component structure of environmental INGOs' virtual network.

Research question 13. First, in order to refresh the readers' memory, research question 13 was restated as following:

RQ13: What is the relationship between the component structure of the environmental INGOs' online communication network and INGO's years of operating?

To examine the relationship between an environmental INGO's years of operation and its *k*-cores membership, a multinomial logistic regression was performed. It was found that the overall *Chi-Square* =78.335 (*df*=143, *n.s.*). INGO's years of operation did not influenced component structure of environmental INGOs' virtual network.

Hypothesis 7 (a, b, c, d & e). First, in order to refresh the readers' memory, hypothesis 7 (a, b, c, d & e) were restated as following:

H7a: Environmental INGOs' virtual network centrality as measured by indegree centrality is significantly predicted by the Internet connectivity of environmental INGOs' countries-of-origin.

H7b: Environmental INGOs' virtual network centrality as measured by outdegree centrality is significantly predicted by the Internet connectivity of environmental INGOs' countries-of-origin.

H7c: Environmental INGOs' virtual network centrality as measured by (incoming tie) closeness centrality is significantly predicted by the Internet connectivity of environmental INGOs' countries-of-origin.

H7d: Environmental INGOs' virtual network centrality as measured by (outgoing tie) closeness centrality is significantly predicted by the Internet connectivity of environmental INGOs' countries-of-origin.

H7e: Environmental INGOs' virtual network centrality as measured by betweenness centrality is significantly predicted by the Internet connectivity of environmental INGOs' countries-of-origin.

Second, before I reported the findings for each hypothesis, some descriptive statistics about the independent variables were provided to put the findings in context.

The average Internet bandwidth bit per second per capita was 20,641.69 ($SD=29,980.88$). The finding revealed that most of the INGOs originated from countries with relatively advanced technological facilities. Nevertheless, the international inequality was huge, with countries such as the Netherlands (78,156 bits per second per capita) Sweden (49,828 bits per second per capita), and United Kingdom (39,664 bits per second per capita) on the top, and countries such as Rwanda (35 bits per second per capita), Zimbabwe (17 bits per second per capita) and Zambia (8 bits per second per capita) on the bottom. In order to reduce the skewness of the data, the connectivity of Internet was also logged before the analysis.

Model 18_3 tested the effect of countries' Internet connectivity level (See Table 18 for details). H7 (a) predicted that global civil actors' virtual network positions as measured by indegree centrality were significantly predicted by the Internet accessibility of civil actors' country-of-origin. An OLS regression was performed, H7 (a) was rejected. R for regression was not significantly different from zero $F(1, 435) = .126, n. s.$, with $R^2 = .000$, and adjusted $R^2 = .000$. Only about 0.2% of variance in indegree centrality can be explained by the Internet connectivity of an organization's country-of-origin.

Model 19_3 tested the effect of countries' Internet connectivity level (See Table 19 for details). H7 (b) predicted that global civil actors' virtual network positions as measured by outdegree centrality were significantly predicted by the Internet accessibility of civil actors' country-of-origin. An OLS regression was performed, H7

(b) was rejected. R for regression was not significantly different from zero $F(1, 435) = .126, n. s.$, with $R^2 = .000$, and adjusted $R^2 = .000$. Only about 0.2% of variance in indegree centrality can be explained by the Internet connectivity of an organization's country-of-origin.

Model 20_3 tested the effect of countries' Internet connectivity level (See Table 20 for details). H7 (c) predicted that global civil actors' virtual network positions as measured by (incoming ties) closeness centrality were significantly predicted by the Internet accessibility of civil actors' country-of-origin. An OLS regression was performed, H7 (c) was rejected. R for regression was not significantly different from zero $F(1, 436) = .795, n. s.$, with $R^2 = .002$, and adjusted $R^2 = .000$. Only about 0.2% of variance in (incoming ties) closeness centrality can be explained by the Internet connectivity of an organization's country-of-origin.

Model 21_3 tested the effect of countries' Internet connectivity level (See Table 21 for details). H7 (d) predicted that global civil actors' virtual network positions as measured by (outgoing ties) closeness centrality were significantly predicted by the Internet accessibility of civil actors' country-of-origin. An OLS regression was performed, and H7 (d) was rejected. R for regression was not significantly different from zero $F(1, 436) = .081, n. s.$, with $R^2 = .000$, and adjusted $R^2 = .000$. Only less than 0.1% of variance in (outgoing ties) closeness centrality can be explained by the Internet connectivity of an organization's country-of-origin.

Model 22_3 tested the effect of countries' Internet connectivity level (See Table 22 for details). H7 (e) predicted that global civil actors' virtual network positions as measured by betweenness centrality were significantly predicted by the Internet

accessibility of civil actors' country-of-origin. An OLS regression was performed, H7 (e) was rejected. R for regression was not significantly different from zero $F(1, 436) = .164, n. s.$, with $R^2 = .000$, and adjusted $R^2 = .000$. Only less than 0.1% of variance in betweenness centrality can be explained by the Internet connectivity of an organization's country-of-origin.

Therefore, the analysis suggested that H7 (a, b, c, d & e) were rejected. The Internet connectivity of INGOs' countries-of-origin did not significantly affect INGOs' network centrality measures such as indegree centrality, outdegree centrality, (incoming tie) closeness centrality, (outgoing tie) closeness centrality and betweenness centrality.

In sum, for Network Society related findings, the analysis found that INGOs' issue areas had an impact on INGOs' indegree centrality, outdegree centrality, (incoming tie) closeness centrality, (outgoing tie) closeness centrality and betweenness centrality. Further, INGOs' issue areas also influenced the number of website visitors and Facebook followers. Finally, the component structure (measured with k -core membership) of the global civil society's online communication network is significantly influenced by civil actors' issue areas.

Environmental INGOs' years of operation affected INGOs' indegree centrality and (incoming ties) closeness centrality. The Internet connectivity, on the other hand, had little impact on the number of website visitors and Facebook followers. The Internet connectivity of environmental INGOs' countries-of-origin also did not significantly affect INGOs' network centrality measures.

Previous tests examined the effect of independent variables separately. However, it was unclear whether variables that exhibited significant effects could remain influential when other variables were in the equation. The following series of standard multiple regression tests were performed to address this issue. Before reporting the findings for these analytic procedures, a correlation test was run to examine the correlations among Independent Variables that describe an organization's operating environment.

Insert Table 25 Here

As can be seen from Table 25, some variables have a high level of correlation. To ensure the accuracy of the regression analysis, collinearity analysis was conducted to detect any potential collinearity problem. Collinearity refers to the situation that two variables are near perfect linear combinations of one another (Tabachnick & Fidell, 2007). As the level of collinearity increased, the regression model estimation became unstable and inflated the standard errors for the coefficients.

In this study, tolerance and VIF (variance inflation factor) values for each predictor are used as a check for multicollinearity. Tolerance is an indication of the percent of variance in the predictor that cannot be accounted for by the other predictors (Tabachnick & Fidell, 2007). On the one hand, a small value of tolerance indicates that this variable is redundant. On the other hand, variable that larger than .10 helps to add value to the regression equation. As a rule of thumb, a variable with VIF value larger than 10 makes unique contributions to the regression (Tabachnick & Fidell, 2007). The analysis shows that all the variables have tolerance level larger than .1. However, a few

variables with VIF value smaller than 10 (Japanese culture=1.29, Issue area #1= 1.58, Issue area #7=1.03, Years of operation=1.13). A closer examination of the nature of these variables did not suggest that they overlap with each other. Therefore, all variables were kept in the equation.

Table 26 presented five set of multiple regressions that examine the combined effect of independent variables on network centrality measures including indegree centrality, outdegree centrality, closeness centrality and betweenness centrality. For indegree centrality, the R for regression was significantly different from zero, $F(30, 371) = 1.654, p < .01$ with $R^2 = .118$, and adjusted $R^2 = .047$. About 11.8% of variance in indegree centrality can be explained by these IVs. Specifically, the effect of Other culture was significant, unstandardized coefficient=12.511, $t(371) = 2.495, p < .01$. Issue 2 (*Biodiversity*) was also significant, unstandardized coefficient=7.633, $t(371) = 3.173, p < .01$. Issue 14 (*mixed aims*) was also significant, unstandardized coefficient=14.137, $t(371) = 2.890, p < .01$. Finally, INGOs' years of operation was also significant, unstandardized coefficient=.078, $t(371) = 2.775, p < .01$.

For outdegree centrality, the R for regression was significantly different from zero, $F(30, 371) = 1.663, p < .01$ with $R^2 = .119$, and adjusted $R^2 = .047$. About 11.9% of variance in outdegree centrality can be explained by these IVs. Specifically, the effect of economic development was significant, unstandardized coefficient=26.788, $t(371) = 1.963, p < .05$. African culture was also significant, unstandardized coefficient=68.964, $t(371) = 3.640, p < .001$. Latin American culture was also significant, unstandardized coefficient=30.117, $t(371) = 2.015, p < .05$. Other culture was also significant, unstandardized coefficient=48.453, $t(371) = 2.564, p < .01$. Organizations focusing on

biodiversity (unstandardized coefficient=19.865, $t(371) = 2.191$, $p < .05$) and mixed aims (unstandardized coefficient=4.189, $t(371) = .227$, $p < .01$) were also significant.

For incoming and outgoing ties closeness centrality, R s for regression were significantly different from zero. A close examination suggested that Latin American culture (unstandardized coefficient=.050, $t(371) = 2.066$, $p < .05$) and Others culture (unstandardized coefficient=.065, $t(371) = 2.132$, $p < .05$) had a significant effect on incoming ties closeness centrality. INGOs focusing on sustainability (unstandardized coefficient=.020, $t(371) = 2.005$, $p < .05$), climate change (unstandardized coefficient=.003, $t(371) = 2.092$, $p < .05$), water resource (unstandardized coefficient=.027, $t(371) = 2.469$, $p < .01$) and mixed aims (unstandardized coefficient=.059, $t(371) = 2.008$, $p < .05$) had a significant effect on incoming ties closeness centrality. Finally, the effect of INGOs' years of operation was also significant on incoming ties closeness centrality, unstandardized coefficient=.000, $t(371) = 2.501$, $p < .01$. For outgoing ties centrality, the effect of economic development (unstandardized coefficient=.083, $t(371) = 2.559$, $p < .01$), Islamic culture (unstandardized coefficient=.087, $t(371) = 2.187$, $p < .05$), biodiversity (unstandardized coefficient=.042, $t(371) = 1.949$, $p < .05$), waste procession (unstandardized coefficient=.052, $t(371) = 2.311$, $p < .05$), promotion (unstandardized coefficient=.036, $t(371) = 2.223$, $p < .05$) and internet connectivity (unstandardized coefficient=-.034, $t(371) = -1.972$, $p < .05$).

For betweenness centrality, the R for regression was significantly different from zero, $F(30, 372) = 2.039$, $p < .001$ with $R^2 = .141$, and adjusted $R^2 = .072$. About 14.1% of variance in betweenness centrality can be explained by these IVs. Specifically, the

effect of economic development was significant, unstandardized coefficient=818.451, $t(371) = 2.567$, $p < .01$. Further, the effect of biodiversity (unstandardized coefficient=1050.782, $t(371) = 4.963$, $p < .001$) and mixed aims (unstandardized coefficient=1652.307, $t(371) = 3.837$, $p < .001$).

Insert Table 26 Here

Table 27 presented two set of multiple regressions that examine the combined effect of independent variables on website visitors and number of Facebook followers. R_s for regression were significantly different from zero. A close examination suggested that the effect of sustainable issue area was significant, unstandardized coefficient=-.009, $t(371) = -2.147$, $p < .05$.

Insert Table 27 Here

Together, the two sets of analysis showed that the most significant predictors are culture, issue areas, and years of operation. These predictors appeared to be significant even when other predictors were included in the equations. Nevertheless, the overall variance that was explained by these variables was not very high. Most of this is because websites' content aspects such as how websites were designed also affect websites popularity. Since this study is interested in studying the structural aspect of global civil society, the content aspect was not examined. Future studies may combine both content aspect and structural aspect to increase the predictive power of variables.

In sum, this chapter reported findings emerged from the analysis. Table 27 summarized the major outcomes of analysis. The patterns suggested that World System Theory, World Polity Theory and the network society thesis were powerful at different levels. How to make sense of these data and findings? What do they suggest about the

predictability about these theories? Could traditional paradigms stand up against the challenge of new social phenomena? The next chapter discusses the implication of research findings in detail.

Insert Table 27 Here

Chapter 6: Discussion and Future Directions

Introduction

This dissertation is interested in studying the virtual networks of international civil actors. The project is important because of three reasons. First, networks have become prominent social structures in current societies (Barabasi, 2002; Castells, 2009). The structures and operations of networks profoundly affect the outcomes of globalization, modernization, civil movements and almost every aspect of our social life (Barnett, 2001; Shumate & Lipp, 2008; Tremayne, 2004). Second, the impact of Internet-based new media on transnational and domestic civil networks is increasingly apparent and has changed the mobilization and organization of social movements. Third, global civil society and civil actors such as INGOs are playing important roles in the global governance process, the generation of public goods, the promotion for social changes, and the search for solutions to social issues (Milner, 2009; Rogers & Ben-David, 2008; Shumate, 2008; Smith & Wiest, 2005). In short, this dissertation is positioned on the intersection of the three significant topics, and the analyses provide a benchmark for understanding the virtual network structure of a group of environmental INGOs and a few critical issues that address the relationships among the three topics.

More specifically, this dissertation attempts to achieve a set of goals. First, the broad goal is to examine a manifestation of the trend toward globalization through one of its most interesting and significant phenomena: global civil society. Global civil society is a space of nongovernmental and noncommercial associations and the networks of relationships and communication among them. Although civil society has existed for hundreds of years, the trend toward globalization breaks boundaries and has

transformed local civic action into an international arena, and hence, opened an era of global civil society. The emerging pattern of transnational civil actions and movements can be understood as a counterweight to states and commercial powers that transcend boundaries. To certain extent, it can be argued that because both capital and social issues have become global, they now require the actors who seek solutions to social problems to collaborate beyond boundaries. A large number of studies and book chapters on the topic of globalization and its impact on everyday life are available, but the majority of these articles are non-empirical. However interesting and worthwhile these contributions may be, few of them offer claims or statements supported by empirical evidence. This dissertation explores theories and hypotheses about globalization through empirical research and is designed to contribute to the debate over globalization.

The second goal is to understand the interaction between the trend toward global civil society and new media technologies that enable it. The study explores theoretical frameworks that help us understand this profound and complex relationship. The enormous growth of the Internet since the mid-1990s has brought attention to the potential consequences of the new media for civil society (Castells, 2001; Norris, 2001). As new media bring new forms of social interactions and new power relationships, the dynamic relationship between the new changes and the existing system has attracted considerable attention. In the current study, through reviewing relevant theories and arguments, a set of hypotheses and research questions were proposed and tested. This dissertation represents an effort that is the first step toward a network-theoretic

conception of global civil society and its interplay with new communication technologies.

Whereas a rich literature on both the topics of the Internet and global civil society exists separately, the literature on the relationship between the Internet and global civil society is relatively thin. Much of the discussion has focused on the impact of the Internet on developing civil societies in countries such as China and Singapore (Chu & Tang, 2005; Yang, 2003). The focus of this dissertation is on civil organizations. Civil organizations are collectives of individuals and are powerful and active actors in the global civil sphere. This dissertation offers a cross-national research design that pools data from 509 environmental INGOs originating from 86 countries. The project understands civil society as a network of civil actors and their relationships and communication networks; it examines the structure of the networks among INGOs working in the environmental field and reveals one aspect of the international system of civil actors.

Third, methodologically, the project attempts to increase the appreciation among communication scholars of the value of network analysis for communication research. A major concern for scholars studying the Internet is the insufficiency of traditional research methods (Howard, 2002). Most traditional research methods are designed for physically centralized, boundary specific social interactions. Those methods used to be sufficient because communication through traditional media was thought to involve more direct patterns of social relationships. Online interactions are less territory-bounded, and online content is networked among and incorporates many social relational aspects of communication. Characteristics of the Internet require alternative

research methods such as social network analysis. As noted by Garton et al. (1997, p. 3) “social network analysis reflects a shift from the individualism common in the social sciences towards a structural analysis”. Social network analysis is a method that focuses on structures and relationships. The combination of social network analysis and the online context is especially powerful because of the applicability of data-mining techniques and the assistance of computer software (Ackland, 2009). This project utilizes network data that are publicly available and traceable, and applies the data to analyze large networks at the international level. This methodological experiment opens up new possibilities for future research.

In the analysis, five major findings emerged. The following sections discuss each finding in detail. The chapter ends by presenting suggestions for future research and alternative views of three critical issues.

Competing Theories and Competing Evidence

One central theme of this project is to explore which of three theoretical approaches is more applicable to the study of INGOs’ virtual networks: the World System approach, the World Polity approach or Castells’ discussion of an interactive network society. In this section, findings that support different aspects of the three competing theories are presented. First, to refresh the readers’ memory of the central theses of the three theoretical approaches, World System Theory, World Polity Theory and Castells’ discussion of interactive network society, are briefly reviewed. Second, the explanatory power of each theory is explained at macro, meso, and micro levels: 1) the overall network structure, 2) the clustering of INGOs, and 3) the individual organization network position features.

Before introducing of macro-, meso-, and micro-level findings, it is necessary to explain the relationships between the three levels and how they are understood in this project. As discussed in Chapter 2, the project views global civil society as a complex structure of rules that evolved over time. These rules are, necessarily, embedded in a broader context of rules such as political, social, economic, and so forth. Working systems of rules of global civil society manifest in the patterns of connection, organizational structure and eventually, systemic capacity to carry out collective actions at the global level. Theories that can be applied to examine global civil society have different explanatory powers at different levels. Macro-level rules reflect the general conditions that a system faces. Meso-level rules apply to groups or units of actors within the system. These units are carriers of meso-level rules. Micro-level rules focus on individual actors and how they interact. Macro-level rules describe the outcomes of meso-units' interactions and cooperation, and meso-level rules reflect the collective consequences of micro-structure.

A brief review of three theatrical frameworks. *World System Theory* takes a structuralism perspective, and assumes that states' behaviors and conditions depend fundamentally on the world system (Chirot and Hall, 1982). The world system is a connected international network and is composed of three structural positions: core, semiperiphery, and periphery (Wallerstein, 1974, 1979, 1980). The class stratification rooted in economic inequality within any society also exists in the international system and exerts influence on international communication and civil society (Barnett, Jacobson, Choi, & Sun-Miller, 1996; Snyder & Kick, 1979). Frank and Gills (1993) argue that world system theory can be applied across disciplines because it helps us see

“a common river and unity of history in a single world system that is multicultural in origin and expression” (p. 17).

World Polity Theory argues that states and institutions’ behaviors cannot be understood outside of a broader international institutions context. This institutionalist account emphasizes the influence of international organizations on international interactions and relationships (Boli & Thomas, 1997, 1999). The interactions among states and international organizations constitute the institutional context of international interactions and also place constraints on institutional connections. The majority of World Polity research focuses on studying how INGOs and IGOs shape the language of international treaties and codes of ethics (Clapp, 1994) and how INGOs and IGOs monitor compliance by governments and business with international treaties and norms (Clark, 2003; Finnemore & Sikkink, 1998; Smith, 1995;).

Castells’ (1996, 2008) discussion of interactive network society defines the concept of network society as a product of the interaction between information, communication technology and society. According to Castells (2008), “a network society is a society whose social structure is made around networks activated by microelectronics-based, digitally processed information and communication technologies” (p. 24). Competing forces such as the net and the self, global networks of instrumentality and cultural construction of identity all contribute to the formation of network society and are manifested through networks. Communication networks that are formed by all kinds of media (including new media and traditional media) are realms where power relationships play out. Further, Castells (2008) contends that: “the network is the message” (p. 339). The interplay of the technological and organizational

transformation of the network society provides the material and cultural basis for networked self-management to become a social practice. The logic of the networks often shape the way messages are formed and communicated. Another key concept of Castells' (2008) network society is that network society is the architecture of self-reconfiguring networks constantly programmed and reprogrammed by issues and powers embedded within the networks.

The overall network structure. At the macro-level, findings suggest that World System Theory has explanatory power to tell us about the structure of global civil actors' virtual networks. Overall, this study did identify a core-semi-periphery-peripheral structure in the network through two analyses: the fitness of core/periphery structure (range from core to periphery, including semi-periphery) in this network and two dimensional metric multidimensional scaling. This finding is consistent with the predictions of World System Theory and demonstrated a radial structure (see Figure 2). Further analysis showed countries' world system positions, as measured either by a categorical variable or a continuous variable, significantly predicted INGOs' coreness (a continuous measure of core/peripheral structure). This finding established the validity of applying the World System Theory to understand the structure of virtual global civil society.

Previous studies have confirmed the influence of the World System on international economic and military relationships (Snyder & Kick 1979), international news and information flows (Barnett, Chon, & Rosen, 2001) and telecommunication (Barnett, 1999). This study reported the impact of the World System on global civil society. Since world system role refers to the structure of a nation's relations with the

rest of the world, this study suggested that civil actors' countries-of-origin offered them different preconditions. Previous research has documented that civil actors originating from different countries have access to different resources, face different opportunities and deal with different constraints (Anheier, Glasius, & Kaldor, 2004). This study suggests that such conditions may further influence civil actors' network positions in the virtual space at the macro-level. Overall, these conditions shape the overall structure of the global civil society, and position some INGOs in the center while putting some in the periphery.

Nevertheless, those findings did not explain how the mechanism operates or what factors influence INGOs' virtual network structure. Although it was assumed that INGOs originating from core countries are more central in the network because they have better access to economic resources or they enjoy better protection in countries where democratic traditions are well-institutionalized, findings did not support this assumption. Future research should investigate how the world system positions of civil actors' countries-of-origin affect the overall network structure of global civil society in the virtual space. To fully investigate the dynamic of this system and establish causality, a longitudinal design is required. A longitudinal study would be valuable on two grounds. First, a longitudinal study would help to establish causal relationships. In the current study, although through reciprocity analysis, the finding suggested that the system is either dominated by a hierarchical structure or it is still evolving, the lack of time dimension in the data prevented a conclusive answer. Future studies with a longitudinal design (using this study as a baseline), would be able to provide a strong conclusion to the status of this system. Second, a longitudinal study may help to reveal

the value of World Polity Theory. In the current study, WPT yielded a limited effect only at the meso-level. Nevertheless, this theory was designed to describe a tendency in the international arena that world polity ties will be increasingly dense and the structure more flat. To test this aspect of WPT, it is necessary to introduce a longitudinal design.

Further, World System Theory predicts that the patterns of relations determine the degree of dependency. In other words, peripheral countries and semi-peripheral countries are more dependent on core countries for resources and development. Dependency arises from a system of asymmetric relationships.

One principle of complex systems is evolution. Evolution is the primary source of transformational change and development. Through a reciprocity analysis, the study diagnosed that the INGOs' network was either evolving or exhibiting a hierarchical structure because only about 9 % of actors were engaged in symmetric relationships. Research has demonstrated that symmetric relationships are unstable (Hanneman & Riddle, 2011). Therefore, it is highly possible that either the network is moving towards stabilization or a hierarchical structure has prevented some INGOs' relationship building efforts. This finding suggested that, potentially, the presence of a hierarchical structure in this network can be problematic. This is because a hierarchical structure may block evolution and social changes in the network. For INGOs originating from peripheral countries, the existence of a World System hierarchy in the global civil sphere may limit their influence and induce further inequality.

Nevertheless, despite the strong effect on the overall network structure, findings suggest that the effects of the world system on individual INGOs' network centrality or clustering patterns are small and often not significant. In other words, World System

Theory has more predictive power at the macro-level but cannot precisely predict specific INGOs' network positions at the meso- and micro-levels. These findings argue in favor of a reconceptualization of the applicability of the World System Theory to understand the virtual structure of global civil society.

The clustering of INGOs. At the meso-level, the findings suggest that a large proportion of the total number of ties were highly clustered into local neighborhoods (See Figure 10 for details). Such a density pattern is completely different from what would be observed in a random network of the same size (Barabasi, 2002). The clustering pattern also resembles the “small world phenomenon” (cliques developed independently in a large network), and suggests that INGOs' virtual clustering pattern is a reflection of choices made by the INGOs. The presence of clique-like local neighborhoods may also contribute to the clustering of similar-minded actors. Further, through a subgroup analysis, 11 subgroups were identified (See Figure 10 for details).

World Polity Theory emphasizes the influence of culture. At the meso-level, this study found organizational culture types affect the clustering patterns of INGOs. The influence of culture on INGOs' network structure may be explained partly by homophily theory. Homophily theory or “birds of a feather flock together” theory describes the tendency of individuals to form networks with others who share beliefs, interests and social status with them (Lazarsfeld & Merton, 1954). This tendency is widely observed in real networks and the diffusion of innovation process (Lin, 2002; McPherson, Smith-Lovin, & Cook, 2002; Rogers, 1995). As argued by McPherson, Smith-Lovin and Cook (2002), culture is among the essential aspect of individuals' categorical membership. Such attributions often times are more salient than vast

differences in social worlds and are easily recognizable. Social scientists have documented individuals' tendency to interact with others who are like themselves (Lin, 2002). This study suggests that INGOs may share similar tendencies in the virtual world. In other words, INGOs originate from the same culture type are more likely to join the same subgroup.

Further, Castells' (1996, 2009) discussion of network society highlights the effect of shared issue areas. At the meso-level, it was found that the component structure (measured with *k*-core membership) of global civil society's online communication network is significantly influenced by civil actors' issue areas. Similar to the effect of culture type, the mechanism may potentially be explained through homophily theory.

In sum, at the meso-level, findings suggest that in order to attract more attention and to connect to potential partners, INGOs tend to build relationships around shared commonalities such as culture and specific issue areas. Internet based networks have to create a space that is broad enough to include diverse organizations, collectives, and networks and they tend to converge around common issues or hallmarks which preserve their autonomy and specificity. For INGOs to form a salient network in a sea of networks, it may be easier for them to cluster around shared commonalities. Such commonalities must be both broad and specific. In other words, they must be broad enough to attract a large number of partners and, at the same time, specific enough to be identifiable. Issue topic, a type of culture, or an ideology may be especially likely to become the common features around which organizations and individuals congregate.

This finding may be especially apparent in the virtual context because virtual connections are relatively less bounded by geographic distance. Further, for INGOs seeking to build transnational networks, this meso-level principle may be especially important. Nevertheless, future studies should consider the potential negative influence of such linking patterns. Self and Yang (2010) found that radical actors may exploit this principle to build niche-thinking through attracting similar minded actors. Group process scholars argue that this type of linking pattern may affect group thinking (Friedkin & Johnsen, 1999). Carley (1991) found that individuals and organizations that form cliques based on similarities may further reinforce their homogeneous beliefs through interactions.

The Individual Organization Network Position Features

At the micro-level, individual characteristics, rather than macro- or meso-level factors strongly influence INGOs' network positions. The study found that INGOs' issue areas and years of operation are especially powerful predictors of network position such as INGOs' network centrality.

Individual actors' centrality is an important structural attribute of networks (Monge & Contractor, 2003). More specifically, findings suggest that INGOs' issue areas influence INGOs' indegree centrality, incoming ties closeness centrality, and betweenness centrality. These findings yield several implications. First, it seems that INGOs' indegree centrality and incoming ties closeness centrality are more sensitive to the influence of INGOs' issue areas. Since both indegree centrality and incoming ties closeness centrality explain how other actors initiate ties with focal INGOs, these findings suggest that INGOs working in issue areas such as biodiversity, promoting

local and global connections and networks, grant foundations and organizations with mixed aims were the more likely to be prestigious actors in this network. This phenomenon may suggest that for INGOs to be able to work in these fields, they need to achieve certain status or in possessing of certain resource. For example, grant foundations appeared to be more prestigious organizations in this network. It may be the case that other INGOs attempted to attract more grant through developing ties with this type of organizations. Second, for betweenness centrality, organizations focusing on biodiversity and with mixed aims, on average, had betweenness centralities that were larger than organizations focusing on research and information sharing. Betweenness is an important measure of relative power and reflects the amount of information flow pass by a certain actor (Freeman, 1979). This finding suggested that organizations focusing on biodiversity and with mixed aims are more likely to be the “middle actor” among other INGOs. For example, INGOs with mixed aims may need to collaborate with broad types of organizations and therefore are more likely to position in between of a pair of actors.

Together, these two implications revealed that, at the micro-level, INGOs’ network positions are mostly governed by what they do and their individual organizational aims. Further research may further explore how each type of INGOs behaves in networks and their differences and similarities.

In addition, INGOs’ issue areas also affect the number of visitors that websites can draw. The analysis found that organizations focused on sustainable development and animal rights tended to have more website visitors than organizations focused on research and information sharing. Further, the analysis found that organizations’ focus

on animal rights tended to have more Facebook followers than organizations focused on research and information sharing.

Organizations' year of operation (a proxy for power-law distribution) is another powerful predictor at the micro-level. The effect of years of operation can be understood with the help of power-law distribution. Power-law distribution describes the pattern of tie distribution in self-regulating and interactive systems such as the Internet (Barabasi and Albert, 1999). In a power law distribution, the more central a position is the more extreme its centrality becomes. The majority of nodes in this distribution are far below the average. As the population increases, the inequality among nodes will increase. This feature of power law has been applied to examine blogs, hyperlinks among websites, and forum responding patterns (Himmelboim, 2010). The power law predicts that each scale-free network may contain several hubs that could define the network's structural stability, dynamic behaviors and other structural features. This distribution also explains the preferential attachment among blogs which is formed based on a group choice pattern: the rich get richer (Barabasi, 2002). Power law further suggests an important quality that will put an actor in the hub position: years of operation or experience. In other words, being an early member of a network gives actors advantages over others because early players have better opportunity and less competition to establish themselves in the network. When later players join the network, early players are the ones they most likely to develop relationships with. Therefore, over time, this network logic gives INGOs with more years of operation a great advantage (Doerfel & Taylor, 2004).

In conclusion, this section adopts a micro-meso-macro perspective to understand how theories and mechanisms manifest at different levels. This approach helps to synthesize disparate findings into a unified framework. This perspective argues that meso-level is not a mere congregation of micro-level phenomena, nor is macro-level a simple extension of the meso-level. Each level follows certain rules and exerts influence on other levels.

Overall, the analysis found the World System Theory has more explanatory power at the macro-level and Castell's discussion of network society was found to have more applicability at the meso- and micro-level. World Polity Theory, however, has rather limited power in explaining the virtual structure of global civil actors, and most of its explanatory power manifested at the meso-level. In this project, world polity ties were found to have little impact on INGOs' network centrality, the number of INGOs' website visitors and the number of INGOs' Facebook followers. Therefore, it may be the case that although world polity ties may have more direct impact on nations' behavior, they have less impact on individual organizations' actions.

Although this study didn't find direct support, it is possible that meso-level structures and rules can be spread into the micro-organizational domain. For example, as discussed in Chapter 1, Boli and Thomas (1997) found that Western culture features such as universalism, individualism, self-authorization and development orientation (These principles are much closer to Western cultures and traditions than to Eastern cultures) were dominant in INGOs' mission statements. This study found that culture type is a significant factor that influences how INGOs' cluster together and, further, INGOs from the Western culture simply are the largest group in this network. In other

words, when INGOs share the same Western culture heritage cluster together, they are more likely to strongly influence each individual INGO, and affect each INGO's mission statement. Therefore, the observed wide spread adoption of Western principles are actually a manifestation of meso-level rules at the micro-level individual organizational behavior. Further studies should examine how meso-level structures affect micro-level behaviors.

Further, meso-and micro-level structures may place constraints on the penetration of macro-level rules into other levels. The fact that besides the world system position of INGOs' countries-of-origin, other factors such as culture, issue areas, and years of operation influence INGOs' network position at different level suggested that these factors may provide momentum for the INGOs' network to further evolve and incorporate dynamic changes.

The Relationships between State and Non-state Actors

One of the themes that have been explored in this project is the relationship between state and non-state actors' networks. Interesting questions about what state characteristics influence civil actors' virtual network positions are asked and tested. This is an attempt to understand a few fascinating yet rarely asked questions: how tight is the relationship between states and civil actors? How much could state characteristics influence organizations originating from those countries?

Although INGOs are capable to act independently of states, this does not necessarily suggest that INGOs are not influenced by states, especially the states that they originate from. As argued in World Polity Theory, as agents of global civil society, the more INGOs become engaged actors that can influence nation states, the more they

become part of the political system rather than being outside it. For example, as INGOs increasingly engage in global information campaigns and participate in polity and decision making, INGOs become part of the system and are influenced by the system. When INGOs actively prepare policy documents, build coalitions, bridge governmental and nongovernmental deliberations, INGOs are integrated into the system. This view may help to explain why states' world system positions affect INGOs' overall network structures. In other words, INGOs' countries-of-origin offered INGOs certain preconditions or major operating contexts that exert influence on INGOs' network structures. This phenomenon may be considered as another form of hegemony.

Further, the study showed that states did not directly influence INGOs. The analysis showed that, at least for environmental INGOs, economic conditions, democracy levels and Internet connective for each country did not significantly predict INGOs' network positions at the meso- and micro-levels. The limited influence may partly be due to the fact that INGOs' memberships are transnational. The inclusion of members from multiple nations may expose INGOs to different state actors and therefore limit the direct influence of one particular nation-state.

The seemingly contradictory finding about states and INGOs' relationships may be a reflection of the tension between state and nonstate actors. On the one hand, research has found that states are often important resource providers of NGOs and INGOs (Stohl & Stohl, 2005). For states to investigate in INGOs, it is highly possible that states attempt to advance certain agenda. On the other hand, INGOs struggle to maintain their autonomy while obtaining funding and resources (Warkentin, 2001). The

pull and push between states and non-state actors may profoundly shape the structure of global civil society, both in reality and in virtual space.

A proper understanding of this tension requires taking a new perspective to understand state and non-state relationships. This project argues that, to a large extent, the current public-private global governance and cooperative relationships among states, intergovernmental and nongovernmental organizations can best be conceptualized as a large network that consists of many sub-networks. The boundaries among these sub-networks are blurring rather than becoming more distinct. In other words, states and non-state actors are not separate entities that interact with each other; but systems of networks that overlap, connect, co-evolve and co-exist. Following this perspective, the traditional idea that views global civil society as a force that is outside of the official political system of international relations and challenging the official states-system from below becomes problematic. This traditional idea is too simplified and only captures a few phenomena of a much more complex system. The relationships between states and nonstate actors are much more complex than merely being conflict or cooperation. This project advocates for a systematic network view of the relationship between state and non-state actors, and understands potential conflicts as patterns of negotiation within a mega-network.

The Potential Effects of the Internet on INGOs' Virtual Network Structure

In this project, the potential effects of the Internet on INGOs' virtual network structure are understood as a form of collective consequence of technology use. The concept of the collective consequence of technology use was first proposed by Fascer (1991) to explain the relationship between technology and social progress. According to

Fascer, the negotiation among interested parties, such as the inventor, users, competitors, and the government shapes the development path of a technology. This perspective brings users into the analysis, and suggests that the effect of technology is the ends that users seek. Further, although individuals take initiatives in determining how they would use a technology, they may also indirectly experience the collective consequence of others' use of the technology. Therefore, a technology may both be a tool that an individual can use to advance his or her goals or needs, and aggregated, the technology becomes a structure that constrains the individual's use of the technology.

This project applies this concept to understand the effect of the Internet on the INGOs' network structure. Each INGO has the freedom to decide how members would use a technology, but their use of technology is also constrained by other INGOs' uses of the technology and the collective consequence following such uses.

The Internet provided the technology structure for the existence of highly-informed and diversified communities and networks. Such networks are relatively easily connected with each other and offer more possibility of mobilizing collective actions at long distance (Shirky, 2008). This project found a relative small geodesic distance in the INGOs' network (geodesic distance is a widely used index for measuring actors' distance in a network. For more details, see Wasserman & Faust, 1994), which suggested that it is not too difficult for these INGOs to initiate new connections with other members of this network. Through a descriptive analysis of INGOs' network centrality measures, the project also identified a large network of INGOs that were directly or indirectly connected to one another through hyperlinks. These organizations

were essentially connected to a fraction of the overall global Internet network. This fraction contains some highly active actors and some less active actors.

Further, connections among network members are not random. Eleven k -core subgroups were identified within this network (See Figure 10 for details). In this network, it was found that a large proportion of the total number of ties was highly clustered into local neighborhoods. Such a density pattern is completely different from what would be observed in a random network of the same size. The clustering pattern also resembles the “small world phenomenon” (cliques developed independently in a large network), and suggests that INGOs’ virtual clustering pattern is a reflection of the choices made by INGOs. The presence of clique-like local neighborhoods may also contribute to the clustering of similar-minded actors.

In other words, although the Internet offers INGOs the potential to develop relationships with any other actors, INGOs actually chose to build relationship according to certain rules or considerations. The patterns of connection reflect both each INGO’s free choice and the constraints placed on them by the collective consequences of other INGOs’ Internet use.

The Logic of Networks

Another interesting aspect of the Internet is its network structure. The Internet is a mega-network, because by connecting a large number of organizations, individuals and machines together, the product is not a mass but a mega-network that follows certain network logics (Wellman et al., 1996). Networks supported by the Internet may be subject to some of same the logics that govern all large networks. The logics of networks are common laws or rules that are widely observed in networks, especially

social networks. Such logics may not significantly influence one specific actor, but they manifest themselves through the collection of individual actions. Social relationship buildings and exchanges of information within networks are neither random nor uniform but rather are patterned, reflecting the logics of the network.

This study found that INGOs' years of operation significantly affected their network centrality. Specifically, the study found that for every additional year of operation, organizations tended to have larger indegree centrality and (incoming ties) closeness centrality. Further, it was found that INGOs' years of operation had a significant impact on an INGO's *k*-cores membership. The effect of organizations' years of operation can be understood through the power-law distribution as discussed in Chapter 3. According to power-law distribution, actors that enter a network earlier have comparative advantage and therefore they tend to attract more recognition from later actors entering the network. Indegree centrality and (incoming ties) closeness centrality are both measures that indicate an actor's prestige level through assessing how likely other actors in a network would initiate contact with the focal actor. The fact the INGOs enter the network early tends to attract much more attention from others and is an example of power-law distribution.

The effect of the network logic may affect how INGOs communicate and build relationships. Castells (2008) argues that the networks are the messages. This argument emphasizes how the structures of networks affect the communication that takes place within those networks. Empirical findings emerged from this study support this argument. In addition, it might be the case that new digital technologies magnify the influence of network logics. The combined effect of new technology and network logics

provide both an effective method of social mobilization and organization and a broader model for creating alternative forms of social, political and organizational networks.

Therefore, new possibilities and realities can be created.

According to Castells (2008), the ability of the network to transfer information and knowledge to its contacts could shift power away from the center to the periphery. Such a shift is fundamentally revolutionary in the sense that the networking logic induces structural change that transcends the agendas of some powerful actors. This concept of network logics is encapsulated in Castells' idea that "the power of flows" inherent in the network takes precedence over "the flow of powers." In other words, the prevalence of the logic of network offers actors opportunities to overcome the existing structure and power relationships.

Further, it is possible that network logics have different manifestations at different levels, and either facilitate or block the effect of other social, political, economic, cultural and technological factors.

The Dominance of the West and Global Inequality

The current study found that INGOs are indeed international civil actors. Environmental INGOs have headquarters in at least 86 different nations and regions and many of them work in multiple nations. INGOs range from large-scale organizations with hundreds of staff to transnational volunteer-run networks with no identifiable location. Regardless of their organizational forms, in their totality, INGOs make up important components of the organizational infrastructure of global civil society.

Roberts (2005) found that although the INGO sector has been explored over the past a few decades, the expansion has not been distributed around the globe. Beckfield

(2003) found that while countries are more equal with regard to their participation in IGOs, there is a great deal of inequality among countries in terms of their ties to INGOs. More specifically, core countries have far more ties with INGOs. This study yielded similar findings for environmental INGOs. The majority of these INGOs originate from the global North, or core countries, as suggested by WST. One interesting finding, though, is that peripheral countries have slightly more INGOs than semi-peripheral countries. This may be due to the fact that many peripheral countries such as Kenya and India face pressing environmental problems, and there are urgent needs for locals and international actors to work together to solve those problems. Further, the unequal distribution of global civil society may suggest that civil society is not a value-free realm. Countries that are more eager to work with INGOs may enjoy more ideological similarity than countries that are reluctant to collaborate with INGOs.

This finding raises issues about the concept of global civil society. In much of the current discussion, the concept of civil society is widely used as a value-free or mostly positive term. For example, World Polity Theory argues that nation states are increasingly tied to the world polity through international organizations. This theory directs little attention to the inequality in ties to INGOs, and celebrates world culture as a universal phenomenon. Nevertheless, the project found that, in terms of the sheer number, core country actors dominated the international civil society. In other words, world polity is promoted by a group of INGOs mainly originating from powerful core countries. To what extent will the domination of core countries define global civil society as a hegemonic sphere? On issues such as environmental protection, the conflict of interests between developed countries and developing countries is profound. To what

extent can we trust the INGOs from core countries to advocate on behalf of billions living in developing countries? This concern may be echoed by some critics of globalization. For example, Falk points out:

What is objectionable is to indulge a kind of market mysticism that accords policy hegemony to the promotion of economic growth, disregarding the adverse social effects and shaping economic policy on the basis of ideological certitudes that are not attentive to the realities of human suffering. (Falk, 2000, p. 48)

Although Falk's criticism is mainly against economic and political institutions, the issue becomes more ironic if we direct it to INGOs. Global civil society is often praised or suggested as the solution to the problems caused by capitalist globalization (Taylor, 2004). Dicken (1998) maintains that NGOs are "the conscience of the world", and he argues that global civil society is a sphere independent from the state and the market. Most importantly, it is globalization from below and from the previously marginalized groups. However, findings of this study demonstrate the same "core country dominant" pattern as has been well documented in the political and economic spheres. This finding also illustrates the relationship between states and non-state actors as discussed in one of the previous sections.

Nevertheless, when examining individual INGOs' network positions and performance, the finding did not suggest that actors originating from core countries necessarily obtain dominance or enjoy significant advantages. This finding, in combination of the inequality in reality, may actually suggest a valuable potential of the Internet, namely, that through the combined effects of the collective consequence of

technology use and logic of networks, INGOs originating from peripheral or semi-peripheral countries may have unprecedented opportunities to exert great influence in the virtual space.

Conclusion

Contributions. This project provides several contributions to the understanding of the relationships between global civil society and the Internet. This study suggests that the search for one theory that governs every aspect of the virtual network of global civil society may not be fertile. This study advocates for a micro, meso-, and macro-classification of the global civil network. More specifically, findings suggest that the World System Theory has more explanatory power at the macro-level while the Network Society perspective accounted for more variance at the micro-and meso-levels. World Polity Theory contributes to a better understanding at the meso-level.

Further, different research approaches may be applied to different levels of research. For example, the micro level focuses on how individual INGOs interact and behave. Micro behaviors reflect a balance between individual organization's choice and the consequences of others' choice. Both qualitative and quantitative research methods can yield meaningful results at this level. Meso-level focuses on networks of organizations. At this level, rule of systematic self-organization can be more clearly examined. Macro level reflects the coordination structure amongst meso units. Micro and macro levels are two perspectives that reveal the structural aspects of the evolving dynamics at the meso level.

The micro, meso, and macro-perspective to the study of global civil society provide several benefits. First, this perspective allows the possibility to synthesize

disparate aspects of the global trend of phenomena. Under this framework, findings from different studies focusing on civil society and movements in different countries and at different levels of research can be brought together. This framework is especially helpful for meta-analysis that aiming at theory building. Second, this perspective emphasizes changes. Changes can be initiated either from the macro- or the micro-end, and they affect different levels with different manifestations. Meso level either adopt or constrain changes. Therefore, the framework is not a static approach. To this framework, the global civil society is fundamentally an evolving and changing system.

Further, the dissertation argues that in the virtual space, systematic evolution and changes are facilitated or constrained by two concepts: the collective consequences of technology use and the logics of networks. Essentially, this project understands the online communication context as influenced by the collective consequences of individual social actors' technology use, social relationships and the logic of networks. This perspective explains why the online communication context demonstrates similarity with the offline world while it reveals new realities and possibilities. The evolution and development of this context is not simply contingent upon human or technology, but the interplay between human society, network logics and expected as well as unexpected consequences of technology use. The relationship between the two concepts is valuable not only to the study of virtual global civil society, but to the study of different types of online communication in general.

Together, this dissertation contributed a unique understanding of the relationship between global civil society and networked communication technology (e.g., the Internet, social media, etc.). The relationship does not feature the dominance of one

force over another; such as social movements determine technology change or vice versa. Rather, the relationship suggests that social movements such as global civil society and technological development both set conditions for each other and the co-evolving and evolution of the two phenomena co-create our social reality. As Jean-Paul Sartre said: “Freedom is what you do with what has been done to you”. In a broad sense, in what ways civil actors can use the Internet for their causes face similar conditions. To promote the development of global civil society, it is important to understand the structure of the network, the network logics and the basic consequences of others’ collective use of technology. To gain the knowledge is to understand the constraints and opportunities that the Internet has to offer for civil actors, and to make the best out of the existing conditions.

These findings imply the formation of a model/theory that rooted in the structural network perspective and incorporates several important variables (e.g., the collective consequence of technology and network logic, etc.). This model/theory attempts to explain micro, meso, and macro level consequences of Internet use on civil society and social movements. The dissertation is an exploratory effort toward this model/theory. The formation of this model/theory requires further research at different contexts, focusing on different types of civil actors and employing different research methods.

This study also proposes a new perspective to understand the relationship between states and non-state actors. Instead of two entities, the dissertation argues that states and non-state actors are interconnected networks. Nevertheless, this network view doesn’t deny the potential issues of power. In this mega-network, different actors have

different agenda. How different agendas interact and shape the overall network is a question that needs to be further explored.

Existing issues. This project does suffer from several shortcomings. The first issue is the emphasis of the relationship between states and non-state actors, while less attention was paid to the influence of the business sector. This issue exists partly because of the lack of a comprehensive database that provides information about international corporates. Further, the theoretical framework may also induced a bias towards business sector because World System Theory and World Polity Theory both deemphasize the role of business sector in international communication and relationships.

Second, the analysis mainly relies on secondary data and hyperlink data. No rich qualitative data were collected to provide a detailed account of these INGOs. It is possible that a more detail-oriented approach may help to reveal more network dynamics especially at the micro-and meso-level. Finally, due to the data collection method, the data attained for this study were from one time period rather than from a range of time. Concepts such as causality and change cannot be captured in the current study. Future research can consider adopt a longitudinal approach or use meta-analysis to synthesize findings from multiple studies.

Another challenge that this project only sometimes met, is to connect structural analysis of INGOs' network to more substantial questions such as how do different structural features affect INGOs' performance. Future studies may use comparative methods to examine how INGOs with different network position perform in the virtual world, and through what mechanism network positions affect INGOs' performances.

Finally, this study isolates INGOs' network from their overall networks. In other words, how INGOs' build networks with IGOs, governments and for-profit corporation is not examined in this project. With improved software, future study may consider incorporating all kinds of ties that affect INGOs' network positions and behaviors.

Future research. This project, as a large scale cross-national research project, helps to identified several areas ripe for future research. The first area of investigation involves the examination of theories and rules that govern INGOs' virtual network structure at micro-, meso- and macro-levels. As illustrated in this project, new research is needed to further identify factors that shape INGOs' network position, subgroup structure and overall connecting patterns. The effectiveness of different research methods and approaches can be explored. Methods such as triangulation and longitudinal design may especially powerful in revealing how mechanism diffusion among different levels of research.

Second, the effects of network logics on human communication are only starting to be explored, let along the effects of network logics on online communication in specific. Future research may systematically introduce and test the effects of network logics. Network logics are patterns of social interaction that are neither dependent on technology nor on society. The effects of these patterns may be strong and unexpected. For online communication research, it is necessary that scholars systematically study these network logics, and develop theories that explain the mechanism and effects of these logics.

Third, future studies should identify types of INGOs' performances (number of partners, number of visitors, number of online events, etc.) that are likely to be affected

by their network positions, and further test how different network positions affect INGOs' performances. A series of such studies may help to build a network theory of INGOs' virtual communication.

Last, but not least, future studies should examine the underlying tension between democracy values and capitalist influence within the realm of global civil society. This dissertation focused on civil actors and their relationships with nation states. This focus does not suggest that the relationship between non-profit civil actors and for-profit civil actors are unimportant or irrelevant. In fact, issues such as front groups and donor influence have challenged the legitimacy of global civil society. Future studies should apply proper theories to examine the interaction between non-profit and for-profit sectors in both domestic and international arenas.

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Appendix A – Tables

Table 1. Research questions and hypotheses.

Research Questions	Hypotheses
<i>General Question</i>	
RQ1: How do environmental INGOs use websites and social media such as Facebook?	
<i>World System Theory</i>	
RQ2: What is the relationship between an environmental INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the economic development level of the organization's country-of-origin?	H1: The structure of environmental INGOs' virtual communication network presents a core-peripheral pattern.
RQ3: What is the relationship between an environmental INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the democracy level of the organization's country-of-origin?	H2(a): Environmental INGOs' network centrality as measured by indegree centrality is significantly predicted by the world system positions of environmental INGOs' countries-of-origin. H2 (b): Environmental INGOs' network centrality as measured by outdegree centrality is significantly predicted by the world system positions of environmental INGOs' countries-of-origin.
RQ4: What is the relationship between an environmental INGO's virtual network component structure and the world system positions of the organization's country-of-origin?	H2 (c): Environmental INGOs' network centrality as measured by (incoming tie) closeness centrality is significantly predicted by the world system positions of environmental INGOs' countries-of-origin. H2 (d): Environmental INGOs' network centrality as measured by (outgoing tie) closeness centrality is significantly predicted by the world

system positions of environmental INGOs' countries-of-origin.

H2 (e): Environmental INGOs' network centrality as measured by betweenness (Freeman Betweenness Centrality) is significantly predicted by the world system positions of environmental INGOs' countries-of-origin.

H3(a): The numbers of visitors to environmental INGOs' websites are significantly influenced by the world system position of environmental INGOs' countries-of-origin.

H3b: The numbers of followers to environmental INGOs' Facebook accounts are significantly influenced by the world system position of environmental INGOs' countries-of-origin.

World Polity Theory

RQ5: What is the relationship between an environmental INGO's virtual network centrality (as measured by indegree & outdegree & closeness centrality and betweenness) and the civilization type of the INGO's country-of-origin?

RQ6: What is the relationship between an environmental INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the world polity ties of the organization's country-of-origin?

H4: The component structure of the environmental INGOs' network is significantly influenced by the civilization types of environmental INGOs' countries-of-origin.

H5a: The websites of environmental INGOs originated from countries with dense world polity ties have more visitors than websites of environmental INGOs originated from countries with sparse world polity ties.

H5b: Facebook accounts of environmental INGOs originated from countries with dense world polity ties have more followers than Facebook accounts of environmental INGOs originated from countries with sparse world polity ties.

Network Society

RQ7: What is the relationship between an

H6: The component structure of

environmental INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the environmental INGO's issue area?

RQ8: What is the relationship between an environmental INGO's virtual network centrality (as measured by indegree centrality, outdegree centrality, closeness centrality and betweenness) and the INGO's years of operation?

RQ9: What is the relationship between an environmental INGO's number of website visitors and its issue area?

RQ10: What is the relationship between an environmental INGO's number of Facebook Followers and the INGO's issue area?

RQ11: What is the relationship between the Internet connectivity of an environmental INGO's country-of-origin and the INGO's number of website visitors?

RQ12: What is the relationship between the Internet connectivity of an environmental INGO's country-of-origin and the INGO's number of Facebook followers?

RQ13: What is the relationship between the component structure of the environmental INGOs' online communication network and INGO's years of operating?

environmental INGOs' virtual network is significantly influenced by environmental INGOs' issue areas.

H7a: Environmental INGOs' virtual network centrality as measured by indegree centrality is significantly predicted by the Internet connectivity of environmental INGOs' countries-of-origin.

H7b: Environmental INGOs' virtual network centrality as measured by outdegree centrality is significantly predicted by the Internet connectivity of environmental INGOs' countries-of-origin.

H7c: Environmental INGOs' virtual network centrality as measured by (incoming tie) closeness centrality is significantly predicted by the Internet connectivity of environmental INGOs' countries-of-origin.

H7d: Environmental INGOs' virtual network centrality as measured by (outgoing tie) closeness centrality is significantly predicted by the Internet connectivity of environmental INGOs' countries-of-origin.

H7e: Environmental INGOs' virtual network centrality as measured by betweenness centrality is significantly predicted by the Internet connectivity of environmental INGOs' countries-of-origin.

Table 2. Countries' Civilization Types Membership.

Civilization	Country
African	Angola, Botswana, Burundi, Cameroon, Central African Republic, Comoros, Congo, Ethiopia, Gabon, Ghana, Ivory Coast, Lesotho, Liberia, Malagasy Republic, Malawi, Mauritius, Mozambique, Namibia, Rwanda, Sao Tome-Principe, Seychelles, Sierra Leone, South Africa, Swaziland, Togo, Uganda, Zaire, Zambia, Zanzibar, Zimbabwe
Buddhist	Bhutan, Burma, Cambodia, Laos, Mongolia, Singapore, Sri Lanka, Thailand
Hindu	India, Nepal
Islamic	Afghanistan, Albania, Algeria, Azerbaijan, Bahrain, Bangladesh, Brunei, Burkina Faso, Egypt, Eritrea, Gambia, Guinea, Guinea-Bissau, Indonesia, Iran, Iraq, Jordan, Kuwait, Kyrgyz Republic, Lebanon, Libya, Malaysia, Maldive Islands, Mali, Mauritania, Morocco, Niger, Oman, Pakistan, Qatar, Saudi Arabia, Senegal, Somalia, Sudan, Syria, Tajikistan, Tunisia, Turkey, Turkmenistan, United Arab Emirates, Uzbekistan, Yemen, Yemen Arab Republic, Yemen People's Republic
Japanese	Japan
Latin American	Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela
Orthodox	Armenia, Belarus, Bosnia-Herzegovina, Bulgaria, Cyprus, Georgia, Greece, Kazakhstan, Macedonia, Moldova, Rumania, Russia, Ukraine, Yugoslavia
Sinic	China, North Korea, South Korea, Republic of Vietnam
Western	Andorra, Australia, Austria, Austria-Hungary, Baden, Bavaria, Belgium, Canada, Croatia, Czech Republic, Czechoslovakia, Denmark, Estonia, Finland, France, Germany, Hanover, Hesse Electoral, Hesse Grand Ducal, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Mecklenburg Schwerin, Modena, Monaco, Netherlands, New Zealand, Norway, Papal States, Papua New Guinea, Parma, Poland, Portugal, San Marino, Saxony, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tuscany, Two Sicilies, United Kingdom, United States of America, Wuerttemberg
Other	Antigua and Barbuda, Bahamas, Barbados, Benin, Chad, Cyprus, Dominica, Federated States of Micronesia, Fiji, Grenada, Guyana, Haiti, Israel, Jamaica, Kenya, Marshall Islands, Nigeria, Palau, Philippines, Solomon Islands, St. Kitts-Nevis, St. Lucia, St. Vincent and the Grenadines, Surinam, Tanzania, Trinidad and Tobago, Vanuatu, Western Samoa

Table 3. Basic organizational information for 509 environmental INGOs.

Organization Name	Country-of-Origin	Founding Year	Issue Area*
Abya Yala Fund For Indigenous Self-Development In South And Meso America	United States	1994	13
Action For Global Climate Community	United Kingdom	2003	5
Action Plan For The Environment In Latin America And The Caribbean	Mexico	1998	12
Action For Solidarity, Equality, Environment And Diversity	Germany	1992	1
Advisory Committee On Protection Of The Sea	United Kingdom	1952	8
African Forest Research Network	Kenya	1998	4
African Forest And Wildlife Commission	Ghana	1959	4
African Wildlife Foundation	United States	1961	3
Alliance For Global Sustainability	Swiss	1997	1
Animal Liberation Front	United States	1976	3
Animals Asia Foundation	Hong Kong	1998	3
Animals Without Frontiers-International	Belgium	-*	3

Animals Traction Network For Eastern And Southern Africa	-	1990	3
Animal Transportation Association	United States	1975	3
Antarctic Climate And Ecosystems Cooperative Research Centre	Australia	2001	5
Antarctic And Southern Ocean Coalition	United States	1978	8
Ape Alliance	United Kingdom	-	3
Arab NGO Network For Environment And Development	Egypt	1990	12
Asia Forest Network	Philippines	1987	4
Asian Environmental Society	India	-	12
Asia Network For Sustainable Agriculture And Bioresources (ANSAB)	Nepal	1992	1
Asian Society For Environmental Protection	Thailand	1984	1
APAFRI-Asia Pacific Association Of Forestry Research Institutions	Malaysia	1995	4
Asia Pacific Greens Network	Japan	2005	12
Asia-Pacific Youth Environmental Federation	Bangladesh	1984	13

Association For Cooperation On Sustainable Development And Sustainable Construction In The Mediterranean	Greece	2004	12
Association For The Development Of Environmental Information	Gabon	1997	11
Association For Environmental Education	Russia	1991	11
Balkan Environmental Association	Greece	1998	12
Balkan Environmental Regulatory Compliance And Enforcement Network	Albania	2001	1
Baltic Environmental Education Network	Finland	1995	11
Baltic Environmental Forum	Latvia	1995	12
Baltic Fund For Nature	Russia	1995	13
Bellagio Forum For Sustainable Development	Germany	1993	1
Black Sea Environmental Programme	Romania	1993	8
Blue Moon Fund	United States	2002	2
Build Environmental Profession In The Commonwealth	United Kingdom	-	12

	Belgium	1948	9
Bureau Of International Recycling			
Campaign For The Earth Foundation	Canada	1989	13
Caretakers Of The Environment International	Netherlands	1986	12
Care For The Wild International	United Kingdom	1984	3
Caribbean Animal Health Network	France	1998	3
Caribbean Environment Program	Jamaica	1983	12
Caribbean Forest Conservation Association	Trinidad and Tobago	1987	4
Caribbean Youth Committee On Human Environment	Barbados	1992	11
Central American, Caribbean And Mexican Association Of Laboratory Animals	Mexico	1992	3
Central American Commission On Environment And Development	El Salvador	1989	1
Center For Communications, Health And The Environment	United States	1990	11
Center For Development And Environment, Berne	Switzerland	-	1
	Norway	1990	1
Center For Development And Environment,			

Oslo			
Center For Environmental Studies In Latin America	United States	1997	11
Center For Environment And Development For The Arab Region And Europe	-	1992	12
Center For Global Environmental Research, Ibaraki	Japan	1900	11
Chartered Institution Of Water And Environmental Management	United Kingdom	1895	8
China Council For International Cooperation On Environment And Development	China	1992	12
Citizens' Alliance For Saving The Atmosphere And The Earth	Japan	1988	5
Civil Society Coalition On Climate Change	United Kingdom	2007	5
Climate Action Network	United States	1989	5
Climate Alliance	Germany	1990	5
Climate Group	United Kingdom	2003	5
Climate Institute	United States	1988	5
Climate Technology Initiative	Germany	1995	5
Climate Youth Network	Belgium	2006	5
	Canada	1994	12
Commission For Environmental Cooperation			

Commonwealth Forestry Association	United Kingdom	1921	4
Confederation Of Environmental And Development NGOs Of Central Africa	Cameroon	1992	12
Co-Operative Programme On Water And Climate	Netherlands	2006	14
Danube Environmental Forum	Hungary	1999	1
Durrell Wildlife Conservation Trust	United Kingdom	-	3
Earthaction Network	United States	1992	1
Earth Community Organization	Canada	1990	12
Earth Council Alliance	United States	1992	12
Earth Data Network For Education And Scientific Exchange	France	1993	11
Earth Day Network	United States	1970	1
Earth First	United States	1979	1
Earth Institute At Columbia University	United States	2002	11
Earth Island	United States	1982	12
Earthjustice Legal Defense Fund	United States	1971	13
	United States	1977	2

Earth Liberation Front

Earthlife Africa	South Africa	1988	12
Earth Policy Institute	United States	2001	11
Earth Rights Institute	United States	1992	12
Earthrights International	Thailand	2006	12
Earthsave International	United States	1988	1
Earth Share	United States	1991	1
Earthstewards Network	United States	1979	12
Earth System Science Partnership	France	2001	11
Earthtrust	United States	1976	3
Earthvoice	United States	1995	11
Earthwatch	Switzerland	1972	11
Earthwatch Europe	United Kingdom	1971	12
Earthway Foundation	United States	1985	13
East African Wild Life Society	Kenya	1961	3
	China	1994	2

East Asian Biosphere Reserve Network			
Eastern Africa Environmental Network	Kenya	1990	12
Eastern Caribbean Coalition For Environmental Awareness	France	1995	11
Eduforest International Forestry Training Network	France	1998	4
Endangered Wildlife Trust	South Africa	1973	3
Environmental Centers For Administration And Technology	Lithuania	1997	11
Environmental Crime Prevention Programme	Spain	1993	1
Environmental Defense	United States	1967	2
Environmental Design Research Association	United States	1968	11
Environmental Development Action In The Third World	Senegal	1972	12
Environmental Education Association Of Southern Africa	South Africa	1982	11
Environmental Foundation For Africa	Sierra Leone	-	13
Environmental Investigation Agency	United Kingdom	1984	11
Environmental For Nuclear Energy	France	-	6
Environmental Law Alliance Worldwide	United States	1989	11

Environmental Law Network International	Germany	1990	11
Environmental Management Accounting Network	United Kingdom	1997	12
Environmental Management Group	Switzerland	1998	1
Environmental Management Secretariat For Latin America And The Caribbean	Uruguay	1996	12
Environmental Mutagen Society	Hungary	1969	11
Environmental Partnership For Sustainable Development	Hungary	1991	1
Environmental Policy And Society	Sweden	-	11
Environmental Training Network For Latin America And The Caribbean	-	1980	11
Environment And Development Service For NGOs	Netherlands	1986	12
Environment Fellowship Of Rotarians	Samoa	-	12
Euro-Asian Regional Association Of Zoos And Aquariums	Russia	1994	3
European Advanced Recycling Network	Germany	-	9
European Association For Aquatic Mammals	United Kingdom	1972	3
European Association For Environmental History	United Kingdom	1995	11

European Association For Environmental Management Education	Italy	-	11
European Association For Environmental And Resource Economics	Italy	1990	11
European Association For The Science Of Air Pollution	Portugal	1986	9
European Association For Zoo And Wildlife Veterinarians	Switzerland	1996	3
European Battery Recycling Association	United Kingdom	1998	9
European Bureau For Conservation And Development	Belgium	1989	1
European Centre For Nature Conservation	Netherlands	1993	1
European Centre For River Restoration	Italy	1995	8
European Centre For Rural And Environmental Interest	Belgium	1991	12
European Christian Environmental Network	Belgium	1998	12
European Climate Forum	Germany	2001	5
European Climate Platform	Belgium	2005	5
European Climate Support Network	Netherlands	2004	5
European Coalition To End Animal Experiments	United Kingdom	1990	3
European Coalition For Farm Animal	United	1993	3

	Kingdom		
European Community Biodiversity Clearing House Mechanism	Denmark	1992	2
European Environmental Agency	Denmark	1990	12
European Environmental Bureau	Belgium	1974	12
European Environmental Centre-Warsaw	Poland	1993	12
European Environmental Citizens' Organization For Standardization	Belgium	2002	11
European Environmental Communication Networks	Denmark	1995	12
European Environmental Information And Observation Network	Denmark	1990	11
European Environment And Sustainable Development Advisory Councils	Belgium	1993	11
European Federation Of Local Forest Communities	Germany	1990	4
European Federation For Transport And Environment	Belgium	1989	9
European Federation Of Waste Management And Environmental Services	Belgium	1981	9
European Forest And Forest Products Forum	Belgium	1992	4
European Forest Genetic Resources Programme	Italy	1994	4

European Forest Institute	Finland	1993	4
European Forest Science Academic Network	Finland	1989	4
European Green Party	Belgium	1984	2
European Green Purchasing Network	Belgium	1997	1
European Greenways Association	Belgium	1998	1
European Institute For Environmental Education And Training	Italy	1992	11
European Mountain Forum	France	1998	2
European Network For Conservation/Restoration Education	Denmark	1997	11
European Network Of Environmental Research Organization	Belgium	1992	11
European Network Of Freshwater Research Organizations	Norway	1993	8
European Network Of Forest Entrepreneurs	Germany	2000	4
European Network For Long-Term Forest Ecosystem And Landscape Research	Sweden	2000	4
European Observatory Of Mountain Forests	France	2000	4
	Belgium	1994	1
European Parliament Intergroup On Sustainable			

Development			
European Partners For The Environment	Belgium	1993	12
European Plastics Recyclers	Belgium	1999	9
European Reviler Network	France	1994	8
European Water Association	Germany	1981	8
Forests And The European Union Resource Network	Belgium	1995	4
Forest Action Network International	Canada	1993	4
Forest Movement Europe	United Kingdom	1989	4
Forest Research Network For Sub-Saharan Africa	Ghana	2000	11
Forest Trends	United States	1998	4
Forum For Development And Environment	Norway	1992	1
Foundation For Environmental Conservation	Switzerland	1972	2
Foundation For Environmental Education	Denmark	1981	11
Foundation For Environmental Security And Sustainability	United States	1999	1
Foundation for Research on International Environment, National Development and	Pakistan	1991	11

Security

Foundation For The Sustainable Development Of The South American Chaco	Paraguay	1995	12
Friends Of Animals	United States	1957	3
Friends Of The Earth Europe	Belgium	1985	12
Friends Of The Earth International	Netherlands	1971	12
Friends Of The Earth Middle East	Israel	1994	12
Frontier Conservation	United Kingdom	1989	2
Global Environmental Action	Japan	1991	1
Global Environmental Forum	Japan	1990	1
Global Environmental Information Exchange Network	Kenya	1975	11
Global Environmental Management Initiative	United States	1990	1
Global Environment Centre	Malaysia	1998	11
Global Environment Facility	United States	1991	1
Global Environment Information Centre	Japan	1996	11
Global Environment And Technology Foundation	United States	1991	13

Global Forest Coalition	Netherlands	2000	4
Global Forest Policy Project	United Kingdom	1995	4
Global Forest Watch	United States	-	4
Global Forum On Oceans, Coasts And Islands	United States	2002	8
Global Greengrants Fund	United States	-	13
Global Green Network	Brazil	1990	12
Global Green University	United Kingdom	-	11
Global Nature Fund	Germany	1998	2
Global Warming International Center	United States	1986	5
Global Water Partnership	Sweden	1996	8
Great Ape Project	Brazil	1993	3
Great Apes Survival Project	Kenya	2001	3
Great Apes World Heritage Species Project	United States	2003	3
Great Lakes Commission	United States	1995	8
Green 10	Belgium	-	12
	Kenya	1977	4

Green Belt Movement			
Green Cross International	Switzerland	1992	1
Green Earth Foundation	United States	-	11
Greenhouse Gas Protocol Initiative	United States	1998	5
Greening Of Industry Network	Netherlands	1991	11
Green Markets International	United States	2002	1
Greennet	United Kingdom	1986	12
Greenpeace International	Canada	1971	14
Greenskies	United Kingdom	1997	6
Greenway Central And East European Environmental NGOs Network	Slovakia	1985	12
Group Of The Greens	Belgium	1984	12
IAEA Marine Environment Laboratories	Monaco	1961	12
Indian Institute For Peace, Disarmament And Environmental Protection	India	1999	14
Indian Ocean Rim Network	India	1997	8
Initiative On Science And Technology For Sustainability	United States	2002	11
Institute For Development, Environment And Peace	Brazil	1989	1

Institute Of Environmental Sciences And Technology	United States	1952	11
Institute For Environmental Security	Netherlands	2002	1
Institute For European Environmental Policy	United Kingdom	1976	11
Institute For Global Environmental Strategies	Japan	1994	11
Integrating Safety And Environment Knowledge In Food Towards European Sustainable	Portugal	2007	11
Inter-African Bureau For Animal Resources	Kenya	1951	3
Inter-African Forest Industrie Association	Gabon	1992	4
Inter-American Center For Development And Environmental And Territorial Research	Venezuela	1965	11
Inter-American Network For Environmental Protection	-	-	12
Inter-Islamic Network On Water Resources Development And Management	Jordan	1987	11
International Academy Of Environmental Safety	United States	-	11
International Animal Rescue	United Kingdom	1989	3
International Association For Forest Resources Management	Morocco	1990	4
International Association For People-Environment Studies	United Kingdom	1981	11

International Centre For The Environmental Management Of Enclosed Coastal Seas	Japan	1990	8
International Centre For Environmental Social And Policy Studies	Kenya	1996	11
International Centre For Environmental Technology Transfer	Japan	1990	1
International Centre For Environment And Development	Egypt	1993	1
International Climate Change Partnership	United States	1998	5
International Commission For The Protection Of The Alps	Liechtenstein	1952	1
International Commission For The Protection Of The Danube River	Austria	1994	8
International Commission For The Protection Of The Elbe	Germany	1990	8
International Commission For The Protection Of Lake Geneva	Switzerland	1957	8
International Commission For The Protection Of The Moselle	French	1963	8
International Commission For The Protection Of The Odra River	Poland	1996	8
International Commission For The Protection Of The Saar	France	1963	8
International Commission Of The Schelde River	Belgium	1995	8
International Commission For The Protection Of The Moselle And Saar	Germany	1961	8
International Committee For Animal Recording	Italy	1951	3
	Germany	1997	8

International Committee For Marine Conservation			
International Committee For Research And Study Of Environmental Factors	Italy	1969	11
International Consortium Of Environmental History Organizations	United States	-	11
International Coral Reef Action Network	United Kingdom	2000	2
International Coral Reef Initiative	United Kingdom	1994	2
International Council For Sustainable Agriculture	Sweden	2009	1
International Court Of Environmental Arbitration And Conciliation	Mexico	1994	1
International Court Of Justice For Animal Rights	Switzerland	1979	3
International Crane Foundation	United States	1973	3
International Earth Rotation And Reference Systems Services	Germany	1987	11
International Elephant Foundation	United States	1998	3
International Emissions Trading Association	Switzerland	1999	5
International Environmental Law Research Centre	United Kingdom	1995	11
International Environmental Modelling And Software Society	Italy	2000	11

International Environment House	Switzerland	-	14
International Environment Institute, Malta	Malta	1987	11
International Environmetrics Society	Sweden	1989	11
International Federation For Animal Health	Belgium	1997	3
International Federation of Environmental Health	Ireland	1986	1
International Federation of Environmental Journalists	France	1993	12
International Forestry Students Association	Germany	1990	4
International Foundation For The Conservation Of Wildlife	France	1976	3
International Foundation For The Protection Of Drinking Water	New Zealand	-	8
International Friends Of Nature	Austria	1895	12
International Fund For Animal Welfare	United States	1969	13
International Fund For Saving The Aral Sea	Tajikistan	1993	13
International Indigenous Forum On Biodiversity	Argentina	1996	2
International Institute For Environment And Development	United Kingdom	1984	1
	Netherlands	1950	11

International Institute For Geo-Information Science And Earth Observation			
International Institute For Sustainable Development	Canada	1990	1
International Institute Of Tropical Forestry	Puerto Rico	1939	11
International Institute For The Urban Environment	Netherlands	-	1
International Institute For Water	France	1984	11
International Institute For Water And Environmental Engineering	Burkina Faso	2004	8
International Lake Environment Committee Foundation	Japan	1986	8
International Land Coalition	Italy	1996	7
International League For The Protection Of Horses	United Kingdom	1927	3
International Marine Animal Trainers Association	United States	1972	3
International Marine Centre	Italy	1975	8
International Marinelife Alliance	Philippines	1985	3
International Marine Simulator Forum	Japan	1978	11
International Maritime Health Association	Belgium	1997	11
International Mountain Society	Switzerland	1981	1
International Network For Environmental Compliance And Enforcement	United States	1989	12
International Network For Environmental Management	Germany	1991	1
International Ocean Institute	Malta	1972	8

International Ocean Network	United States	1993	12
	United States	2004	9
International Ocean Noise Coalition			
International Office For Water	France	1991	8
	United Kingdom	1978	13
International Oil Pollution Compensation Supplementary Fund			
International Organization Of Plant Biosystematists	Spain	1960	2
International Organization For Plant Information	Australia	1991	11
International Plant Protection Congresses	United States	1946	4
International Polar Foundation	Belgium	2002	11
International Rescue Dog Organization	Austria	1993	3
International Research Center For Energy And Economic Development	France	1974	11
International Research Group On Wood Protection	Sweden	1969	11
International Research Institute For Climate And Society	United States	2007	11
International Rivers	United States	1987	9
International Society For Animal Rights	United States	1990	3
International Society Of Doctors For The Environment	Switzerland	1990	12
International Society Of Environmental Botanists	India	1996	11
	-	-	11

International Society For Environmental Education			
International Society Environmental Ethics	United States	1989	11
International Society For Environmental Geotechnology	United States	-	11
International Society For Environmental Protection	Austria	1987	12
International Society Of Food, Agriculture And Environment	Finland	2000	12
International Society For The Protection Of Animals	United States	1959	3
International Society For Tropical Crop Research And Development	-	1990	11
International Society For Tropical Foresters	United States	1950	12
International Society For Tropical Ecology	India	1956	11
International Soil Conservation Organization	United States	1983	7
International Sustainable Energy Organization	Switzerland	2002	6
International Tropical Fruits Network	Malaysia	2001	4
International Tropical Timber Organization	Japan	1985	4
International University On Sustainable Development	France	-	11
International Water Academy	Norway	1968	9
International Water Association	United Kingdom	1999	9
International Water Association Asia Pacific	Australia	1999	9

Group			
International Water Association Liaison Committee	India	1994	9
International Waterfowl And Wetlands Research Bureau	United Kingdom	1947	9
International Water History Association	United States	2001	11
International Water Law Research Institute	United Kingdom	-	11
International Water Management Institute	Sri Lanka	1984	9
International Water Mist Association	Germany	1998	9
International Water Resources Association	Canada	1971	9
International Waters Learning Exchange And Resource Network	United States	2001	9
International Wildlife Coalition	United States	1983	3
International Wildlife Rehabilitation Council	United States	1972	3
International Wolf Center	United States	1985	3
Iwokrama International Centre For Rain Forest Conservation And Development	Guyana	1996	4
Landlife International	United Kingdom	1975	2
Latin American Federation Of Animal Health	Peru	1988	3
Latin American Forum Of Environmental Sciences	Argentina	1989	11
Latin American Mountain Forum	Peru	1992	2
Latin American Network On Environmental Conflicts	Chile	1996	1

Leadership For Environment And Development	United Kingdom	1991	12
Managing The Environment Locally In Sub-Saharan Africa	Brazil	1996	12
Marine Environmental Data Information Referral System	France	1979	11
Marine Environmental Research Institute	United States	2000	11
Mediterranean Association Of Environmental And Space Sciences	France	1990	11
Mediterranean Association To Save The Sea Turtles	United Kingdom	1988	3
Mediterranean Centre For The Environment	France	1989	11
Mediterranean Environmental Technical Assistance Programme	United States	1990	11
Mediterranean Environment And Development Observatory	France	1980	1
Mediterranean Environment Programme	-	1988	1
Mediterranean Global Ocean Observing System	Malta	1997	9
Mediterranean Information Office For Environment, Culture And Sustainable Development	Greece	1990	12
Mediterranean Marine Bird Association	France	1984	3
Mediterranean NGO Network For Ecology And Sustainable Development	Spain	1995	12
Mediterranean Water Institute	France	1982	8
Mediterranean Wetland	Greece	1971	1
Mediterranean Scientific Association Of Environmental Protection	Germany	1979	11

Network For Environmental Training At Tertiary Level In Asia And The Pacific	Thailand	1989	11
Network For Environmental And Sustainable Development In Africa	Ivory Coast	2001	12
Network Of Expertise For The Global Environment	Canada	1992	11
Network For Sustainable Development Of Tourism Destinations In Europe	Belgium	2002	1
Network For Water And Sanitatio International	Kenya	1986	10
The New Forests Project	United States	1977	4
NGO Coalition For Environment	Nigeria	1995	12
NGO Committee On Population And Development	United States	-	1
NGO Committee On Sustainable Development, New York	United States	2002	1
Nordic Council For Animal Welfare	Denmark	1962	3
Nordic Council For Wildlife Research	Sweden	1971	3
Nordic Forestry Federation	Norway	1946	4
Nordic Marine Academy	Norway	2005	11
Nordic Network For Environmental Impact Assessment, Strategic Environmental Assessment And Regional Development	Sweden	1999	11
	Finland	2002	4
Nordic Network On Forest Regeneration	Sweden	1964	1
Nordic Recycling Federation			

North American Center For Environmental Information And Communication	Mexico	1995	11
North American Plant Protection Organization	Canada	1976	4
North Atlantic Biocultural Organization	United States	1992	11
North Atlantic Marine Mammal Commission	Norway	1992	3
North Alliance For Sustainability	Netherlands	1990	1
Northern Dimension Environmental Partnership	United Kingdom	2002	1
Observatoire Permanent De L'environnement	Italy	1995	11
OIE-World Organization For Animal Health	France	1924	3
Oil Campanies' European Association For Environment, Health, And Safety In Refining And Distribution	Belgium	1963	6
Our World Is Not For Sale	-	-	1
Pacific Environment	United States	1987	14
Pacific Environment Information Network	Samoa	1993	11
Pacific Islands Maritime Association	Fiji	1996	8
Pacific Plant Protection Organization	Fiji	1994	4
Pacific Water Association	Fiji	2008	8
Pacific Whale Foundation	United States	1980	3
Pan African Organization For Sustainable	Ghana	1997	1

Development			
Partnership For African Environmental Sustainability	Uganda	2000	1
Partnership For Observation Of The Global Oceans	United Kingdom	1999	8
Pastoral And Environmental Network In The Horn Of Africa	United Kingdom	1989	12
People And Planet International	United Kingdom	1992	12
Permanent Secretariat To The Agreement On The Conservation Of African-Eurasian Migratory Waterbirds	Germany	1999	3
Pesticide Action Network	Malaysia	1982	2
PET Container Recycling Europe	Belgium	1996	9
Pew Center On Global Climate Change	United States	1998	5
Philippine Centre For Population And Development	Philippine	1973	10
Plan Of Action For Cooperation In The Protection And Sustainable Development Of The Marine And Coastal Environment Of The Northeast Pacific	Nicaragua	-	1
Planet Aid	United States	1997	1
Planetary Association For Clean Energy	Canada	1975	6
Planetary Coral Reef Foundation	United States	1991	2
	Indonesia	1990	4
Plant Resources Of South-East Asia			

Plant Resources For Tropical Africa	Netherlands	2000	4
Population Action International	United States	1965	1
Population Association Of America	United States	1930	1
Population Council	United States	1952	10
The Population Institute	United States	1969	10
Program On Man And The Biosphere	France	1971	11
Program For Research And Documentation For A Sustainable Society	Norway	1996	11
Pure Water For The World	United States	1994	8
Regional Clean Sea Organization	United Arab Emirates	1972	8
Regional Community Forestry Training Centre For Asia And The Pacific	Thailand	1987	4
Regional Environmental Centre For The Caucasus	Georgia	2000	1
Regional Institute Of Environmental Technology	Singapore	1993	11
Regional Institute For Population Studies	Ghana	1972	11
	Norway	1998	8
Regional Program Of Action For The Protection Of The Arctic Marine Environment From Land-			

Based Activities			
Renewable Energy, Environment And Solidarity Group	France	1976	6
Renewable Energy Policy Network For The 21st Century	France	2005	6
River Basin Initiative	Malaysia	2000	3
Rivers Watch East And Southeast Asia	Philippines	2000	8
Save The Elephants	Kenya	1970	3
Save The Tiger Fund	United States	1995	13
Scientific Committee On Problems Of The Environment	France	1969	11
Seas At Risk	Netherlands	1986	8
Secretariat Of The Convention On Biological Diversity	Canada	1993	2
SE European Bird Migration Network	Poland	1995	3
Shared Earth	United Kingdom	-	4
Society For Research And Initiatives For Sustainable Technologies	India	1993	11
Southeast Asia Rivers Network	Thailand	1999	8
Southern African Institute Of Forestry	South Africa	1968	4
South And Southeast Asia Network For Environmental Education	India	1993	11

Stockholm Environment Institute-Institute For Environmental Technology And Management	Sweden	1989	1
Stockholm International Water Institute	Sweden	1991	8
Sustainable Challenge Foundation	Netherlands	1992	1
Sustainable Agriculture Centre For Research, Extension And Development In Africa	Kenya	-	10
Sustainable Agriculture And Forestry For International Environmental Rehabilitation	Belgium	2000	1
Sustainable Agriculture Network	United States	1991	1
Sustainable Base Re-Use Institute	United States	2003	1
Sustainable Development Communications Network	Canada	1996	12
Sustainable Development Networking Programme	United States	1993	1
Sustainable Energy And Economy Network	United States	1963	6
Sustainable Energy Society Of Southern Africa	South Africa	1974	6
Sustainable Energy Watch	France	1997	6
Sustainable European Research Institute	Austria	1999	11
	Switzerland	1994	1
Sustainable Project Management-Public Private			

Partnership For The Urban Environment Sustainable Science Institute	United States	1998	11
Third World Center For Water Management	Mexico	-	8
Trilateral Wadden Sea Forum	Germany	2001	8
Tropical Forest Foundation	United States	1990	4
Tropical Rainforest Foundation	Guatemala	1994	4
UNEP International Environmental Technology Centre	Japan	1992	11
UNEP Riso Centre On Energy, Climate And Sustainable Development	Denmark	1990	1
Union For African Population Studies	Senegal	1984	1
	Ghana	1986	6
UNU Institute For Natural Resources In Africa	United Kingdom	1981	10
Wateraid			
Waterbird Society	United States	1986	3
Water Centre For The Humid Tropics Of Latin America And The Caribbean	France	1992	8
Water And Development Information For Arid Lands Global Network	France	2003	8
Water Environment Federation	United States	1928	11
Water Integrity Network	Germany	2006	8
Water Monitoring Alliance	France	2005	8

Waternet	Zimbabwe	2000	8
Water Quality Association	United States	-	8
Water Research Fund Of Southern Africa	Zimbabwe	1999	8
Water And Sanitation In Developing Countries	Switzerland	-	8
Water And Sanitation Programme	United States	1978	8
Water And Sanitation For The Urban Poor	United Kingdom	-	8
Water Solidarity Network	France	1984	8
Water Supply And Sanitation Collaborative Council	Switzerland	1990	8
Water Utility Partnership For Africa	Senegal	1991	8
Wildcare Africa Trust	South Africa	1985	3
Wild Chimpanzee Foundation	Germany	2000	3
Wildness Society	United States	1935	3
The Wild Foundation	United States	1974	13
Wildlife Trust	United States	1912	3
Wild Salmon Center	United States	1992	3

Wildlife Alliance	United States	1999	3
Wildlife Conservation Society	United States	1895	3
World Animal Net	United Kingdom	1997	3
World Association Of Social And Water Conservation	China	1983	1
World Association Of Wildlife Veterinarians	Australia	1990	3
World Commission On Protected Areas	Switzerland	1958	2
World Conservation Trust	Switzerland	1994	3
World Environment Center	United States	1974	1
World Flower Council	United States	1983	4
World Forest Institute	United States	1964	4
World Forestry Center, Poland	United States	1964	4
World Ocean Network	France	2002	8
World Network Of Biosphere Reserves	France	1971	2
World Rainforest Movement	Uruguay	1986	4
World Small Animal Veterinary	Denmark	1959	3
World Society For The Protection Of Animals	United	1981	3

	Kingdom		
World Water Assessment Programme	France	-	11
World Water Council	France	1996	8
World Weather Watch	Switzerland	1968	5
Youth Water Action Team	Netherlands	2001	8
Worldwide Dragonfly Association	United Kingdom	1997	3
World Wide Fund For Nature	Switzerland	1961	3
Youth And Environment Europe	Czech Rep	1983	11

*a. Issue areas include: Sustainable Development=1, Biodiversity=2, Animal Rights=3, Forestry Protection and Plants Protection =4, Climate Change=5, Energy=6, Extractive Industries (Logging, Mining, and Oil Extraction)=7, Water Resource=8, Waste Procession, Recycling, Controlling of Pollution=9, Indigenous People's Rights (People Facing Threats to Their Lands, Cultures, and Nature Resources)=10, Research and Information Sharing=11, Promoting Local and Global Connection and Networks=12, Grant Foundations=13, Mixed aims=14

*b. Information unavailable= “-”

Table 4. Correlations among ISPI, organizational website ownership, social media types and Facebook ownership.

	ISPI	Website	Social Media	Facebook
Information System Position Index (ISPI)	–			
Website Ownership	.093*	–		
Number of Social Media Use	.133**	.188**	–	
Facebook Ownership	.212**	.235**	.492**	–

*. Correlation is significant at the 0.05 level.

** . Correlation is significant at the 0.01 level.

Table 5. Unstandardized coefficients from OLS Regressions of Indegree centrality in 2011 on ISI, World-System Position, GNI per capita, and Polity IV: 509 INGOs.

Independent Variables	Model 5_1	Model 5_2	Model 5_3	Model 5_4
<i>World System Position</i>				
ISPI	.001 (.029)	–	–	–
Core	–	– ^a	–	–
Semi-Periphery	–	-.733 (1.333)	–	–
Periphery	–	-.330 (1.354)	–	–
<i>Economic Development</i>				
GNI per capita, 2011	–	–	0.659 (.779)	–
<i>Democracy Level</i>				
Polity IV, 2011	–	–	–	.111 (.164)
Constant	4.806 (.539)	4.964 (.498)	1.879 (3.454)	3.809 (1.522)
R ²	.002	.001	.002	.001

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Core country is the reference group.

Table 6. Unstandardized coefficients from OLS Regressions of Outdegree Centrality in 2011 on ISPI, World-System Positions, GNI per capita, and Polity IV: 509 INGOs.

Independent Variables	Model 6_1	Model 6_2	Model 6_3	Model 6_4
<i>World System Position</i>				
ISPI	.121 (.109)	–	–	–
Core	–	– ^a	–	–
Semi-Periphery	–	13.236** (4.863)	–	–
Periphery	–	2.415 (4.941)	–	–
<i>Economic Development</i>				
GNI per capita, 2011	–	–	-3.783 (2.919)	–
<i>Democracy Level</i>				
Polity IV, 2011	–	–	–	.165 (.611)
Constant	6.249 (2.020)	2.944 (1.817)	21.555 (12.938)	3.417 (5.675)
R ²	.003	.016*	.004	.000

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Core country is the reference group.

Table 7. Unstandardized coefficients from OLS Regressions of (Incoming Ties) Closeness Centrality in 2011 on ISPI, World-System Positions, GNI per capita, and Polity IV: 509 INGOs.

Independent Variables	Model 7_1	Model 7_2	Model 7_3	Model 7_4
<i>World System Position</i>				
ISPI	.000 (.000)	–	–	–
Core	–	– ^a	–	–
Semi-Periphery	–	-.016* (.008)	–	–
Periphery	–	-.002 (.008)	–	–
<i>Economic Development</i>				
GNI per capita, 2011	–	–	0.008 (.005)	–
<i>Democracy Level</i>				
Polity IV, 2011	–	–	–	0.009 (.001)
Constant	.267 (.003)	.272 (.003)	.234 (.021)	.270 (.009)
R ²	.002	.009	.006	.000

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Core country is the reference group.

Table 8. Unstandardized coefficients from OLS Regressions of (Outgoing Ties) Closeness Centrality in 2011 on ISPI, World-System Positions, GNI per capita, and Polity IV: 509 INGOs.

Independent Variables	Model 8_1	Model 8_2	Model 8_3	Model 8_4
<i>World System Position</i>				
ISPI	.000 (.000)	–	–	–
Core	–	– ^a	–	–
Semi-Periphery	–	-.004 (.012)	–	–
Periphery	–	.000 (.013)	–	–
<i>Economic Development</i>				
GNI per capita, 2011	–	–	.012 (.007)	–
<i>Democracy Level</i>				
Polity IV, 2011	–	–	–	.002 (.002)
Constant	.274 (.005)	.278 (.005)	.225 (.032)	.262 (.014)
R ²	.002	.000	.006	.003

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Core country is the reference group.

Table 9. Unstandardized coefficients from OLS Regressions of Betweenness Centrality in 2011 on ISPI, World-System Positions, GNI per capita, and Polity IV: 509 INGOs.

Independent Variables	Model 9_1	Model 9_2	Model 9_3	Model 9_4
<i>World System Position</i>				
ISPI	2.824 (2.585)	–	–	–
Core	–	– ^a	–	–
Semi-Periphery	–	-90.163 (116.30)	–	–
Periphery	–	32.244 (118.18)	–	–
<i>Economic Development</i>				
GNI per capita, 2011	–	–	58.614 (69.215)	–
<i>Democracy Level</i>				
Polity IV, 2011	–	–	–	13.593 (14.460)
Constant	180.431 (47.794)	155.975 (43.398)	109.722 (306.78)	26.216 (134.32)
R ²	.003	.002	.002	.002

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Core country is the reference group.

Table 10. Unstandardized coefficients from OLS Regressions of Number of Website Visitors in 2011 on World-System Position and World Polity Ties: 509 INGOs.

Independent Variable	Model 10_1	Model 10_2	Model 10_3
<i>World System Position</i>			
ISPI	0.001 (.000)	–	–
Core	–	– ^a	–
Semi-Periphery	–	-.003 (.003)	–
Periphery	–	.001 (.003)	–
<i>World Polity Ties</i>			
Number of INGOs	–	–	.006 (.000)
Constant	.004 (.001)	.004 (.001)	.004 (.001)
R^2	.000	.003	.000

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Core country is the reference group.

Table 11. Unstandardized coefficients from OLS Regressions of Number of Facebook Followers in 2011 on World-System Position and World Polity Ties: 509 INGOs.

Independent Variable	Model 11_1	Model 11_2	Model 11_3
<i>World System Position</i>			
ISPI	-162.071 (279.235)	–	–
Core	–	– ^a	–
Semi-Periphery	–	-6949.749 (19657.813)	–
Periphery	–	-4311.806 (16839.934)	–
<i>World Polity Ties</i>			
Number of INGOs	–	–	–
Constant	11702.028 (6497.165)	9826.949 (5144.685)	–
R^2	.002	.001	

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Core country is the reference group.

Table 12. Unstandardized coefficients from OLS Regressions of INGOs' *k*-core Membership in 2011 on World-System Position: 509 INGOs.

Independent Variable	Model 12_1 ISPI
<i>k</i> -core Membership	
<i>k</i> -core#1	1.197* (.513)
<i>k</i> -core#2	1.082* (.520)
<i>k</i> -core#3	.301 (.593)
<i>k</i> -core#4	.443 (.576)
<i>k</i> -core#5	-.020 (.639)
<i>k</i> -core#6	.498 (.570)
<i>k</i> -core#7	-.538 (.741)
<i>k</i> -core#8	-.025 (.640)
<i>k</i> -core#9	.248 (.600)
<i>k</i> -core#10	.510 (.569)
<i>k</i> -core#11	–
Overall <i>Chi-Square</i>	341.985

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

Table 13. Unstandardized coefficients from OLS Regressions of Indegree Centrality in 2011 on World Polity Ties, Internet Availability, and Civilization Types: 509 INGOs.

Independent Variables	Model 13_1	Model 13_2
<i>World Polity Ties</i>		
Number of INGOs	.001 (.011)	–
<i>Civilization</i>		
African	–	-3.433 (2.267)
Buddhist	–	.580 (3.483)
Hindu	–	-3.683 (4.109)
Islamic	–	-2.827 (2.267)
Japanese	–	-1.318 (3.080)
Latin American	–	.602 (2.267)
Orthodox	–	-3.275 (3.263)
Sinic	–	-1.763 (5.290)
Western	–	– ^a
Others	–	4.120* (1.965)
Constant	4.879 (.606)	4.963 (.493)
R ²	.000	.024

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Western culture is the reference group.

Table 14. Unstandardized coefficients from OLS Regressions of Outdegree centrality in 2011 on World Polity Ties, Internet Availability, and Civilization Types: 509 INGOs.

Independent Variables	Model 14_1	Model 14_2
<i>World Polity Ties</i>		
Number of INGOs	-.058 (.040)	–
<i>Civilization</i>		
African	–	34.77*** (8.251)
Buddhist	–	-.240 (12.679)
Hindu	–	-2.494 (14.959)
Islamic	–	-.848 (8.251)
Japanese	–	.013 (11.214)
Latin American	–	12.44 (8.251)
Orthodox	–	-1.454 (11.877)
Sinic	–	-1.487 (19.256)
Western	–	– ^a
Others	–	6.011 (7.153)
Constant	7.116 (2.223)	2.854 (1.796)
R ²	.005	.044**

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Western culture is the reference group.

Table 15. Unstandardized coefficients from OLS Regressions of (Incoming Ties) Closeness Centrality in 2011 on World Polity Ties, Internet Availability, and Civilization Types: 509 INGOs.

Independent Variables	Model 15_1	Model 15_2
<i>World Polity Ties</i>		
Number of INGOs	.005 (.000)	–
<i>Civilization</i>		
African	–	-.002 (.014)
Buddhist	–	.000 (.021)
Hindu	–	-.026 (.025)
Islamic	–	-.015 (.014)
Japanese	–	.030 (.018)
Latin American	–	.004 (.014)
Orthodox	–	.007 (.020)
Sinic	–	-.011 (.033)
Western	–	– ^a
Others	–	-.004 (.012)
Constant	.267 (.004)	.269 (.003)
R ²	.001	.013

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Western culture is the reference group.

Table 16. Unstandardized coefficients from OLS Regressions of (Ourgoing Ties) Closeness Centrality in 2011 on World Polity Ties, Internet Availability, and Civilization Types: 509 INGOs.

Independent Variables	Model 16_1	Model 16_2
<i>World Polity Ties</i>		
Number of INGOs	.003 (.000)	–
<i>Civilization</i>		
African	–	.001 (.021)
Buddhist	–	-.033 (.032)
Hindu	–	.010 (.038)
Islamic	–	.003 (.021)
Japanese	–	.044 (.027)
Latin American	–	.032 (.021)
Orthodox	–	-.014 (.030)
Sinic	–	.000 (.049)
Western	–	– ^a
Others	–	-.012 (.018)
Constant	.277 (.006)	.277 (.005)
R ²	.000	.016

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Western culture is the reference group.

Table 17. Unstandardized coefficients from OLS Regressions of Betweenness Centrality in 2011 on World Polity Ties, Internet Availability, and Civilization Types: 509 INGOs.

Independent Variables	Model 17_1	Model 17_2
<i>World Polity Ties</i>		
Number of INGOs	-1.253 (.955)	–
<i>Civilization</i>		
African	–	-149.872 (199.68)
Buddhist	–	-152.267 (306.82)
Hindu	–	-152.267 (361.99)
Islamic	–	-125.96 (199.68)
Japanese	–	58.479 (257.80)
Latin American	–	184.112 (199.68)
Orthodox	–	-148.918 (287.41)
Sinic	–	-78.997 (465.98)
Western	–	– ^a
Others	–	105.478 (173.10)
Constant	196.645 (52.731)	152.267 (43.453)
R ²	.004	.007

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Western culture is the reference group.

Table 18. Unstandardized coefficients from OLS Regressions of Indegree Centrality in 2011 on Issue Areas, Years of Operation and Internet Connectivity: 509 INGOs.

Independent Variables	Model 18_1	Model 18_2	Model 18_3
<i>Issue Areas</i>			
Issue 1: Sustainable Development	1.118 (1.492)	–	–
Issue 2: Biodiversity	7.981*** (2.284)	–	–
Issue3: Animal Rights	1.655 (1.499)	–	–
Issue 4: Forestry and Plants Protection	1.490 (1.723)	–	–
Issue 5: Climate Change	2.228 (2.284)	–	–
Issue 6: Energy	1.083 (3.012)	–	–
Issue 7: Extractive Industries	1.173 (6.452)	–	–
Issue 8: Water Resource	2.929 (1.563)	–	–
Issue 9: Waste Procession	2.444 (2.284)	–	–
Issue 10: Indigenous People's Rights	.373 (3.808)	–	–
Issue 11: Research& Information Sharing	– ^a	–	–
Issue 12: Promoting Connection	3.514* (3.514)	–	–
Issue 13: Grant Foundations	2.054 (2.054)	–	–
Issue 14: Mixed Aims	11.523** (4.149)	–	–
<i>Years of Operation</i>			
From the Founding Year to 2011	–	.068** (.026)	–
<i>Internet Connectivity</i>			
Internet bandwidth bits per second per capita	–	–	.189 (.533)
Constant	2.777 (.967)	3.266 (.787)	4.021 (2.155)
R^2	.047*	.016**	.000

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Issue 11 is the reference group.

Table 19. Unstandardized coefficients from OLS Regressions of Outdegree Centrality in 2011 on Issue Areas, Years of Operation and Internet Connectivity: 509 INGOs.

Independent Variables	Model 19_1	Model 19_2	Model 19_3
<i>Issue Areas</i>			
Issue 1: Sustainable Development	-1.196 (5.554)	–	–
Issue 2: Biodiversity	20.282** (8.502)	–	–
Issue3: Animal Rights	8.597 (5.580)	–	–
Issue 4: Forestry and Plants Protection	-.809 (6.414)	–	–
Issue 5: Climate Change	-1.803 (8.502)	–	–
Issue 6: Energy	.528 (11.211)	–	–
Issue 7: Extractive Industries	.118 (24.013)	–	–
Issue 8: Water Resource	-1.158 (5.817)	–	–
Issue 9: Waste Procession	1.234 (8.502)	–	–
Issue 10: Indigenous People’s Rights	-2.582 (14.172)	–	–
Issue 11: Research& Information Sharing	– ^a	–	–
Issue 12: Promoting Connection	2.949 (5.850)	–	–
Issue 13: Grant Foundations	-1.635 (9.984)	–	–
Issue 14: Mixed Aims	3.758 (15.441)	–	–
<i>Years of Operation</i>			
From Founding Year to 2011	–	.004 (.097)	–
<i>Internet Connectivity</i>			
Internet bandwidth bits per second per capita	–	–	-5.167 (1.985)
Constant	2.882 (3.600)	4.950 (2.926)	25.374 (8.019)
R^2	.023	.000	.015

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Issue 11 is the reference group.

Table 20. Unstandardized coefficients from OLS Regressions of (Incoming Ties) Closeness Centrality in 2011 on Issue Areas, Years of Operation and Internet Connectivity: 509 INGOs.

Independent Variables	Model 20_1	Model 20_2	Model 20_3
<i>Issue Areas</i>			
Issue 1: Sustainable Development	.019* (.009)	–	–
Issue 2: Biodiversity	.023 (.014)	–	–
Issue3: Animal Rights	.006 (.009)	–	–
Issue 4: Forestry and Plants Protection	.001 (.011)	–	–
Issue 5: Climate Change	.030* (.014)	–	–
Issue 6: Energy	-.002 (.019)	–	–
Issue 7: Extractive Industries	.020 (.040)	–	–
Issue 8: Water Resource	.025** (.010)	–	–
Issue 9: Waste Procession	.017 (.014)	–	–
Issue 10: Indigenous People’s Rights	.002 (.023)	–	–
Issue 11: Research& Information Sharing	– ^a	–	–
Issue 12: Promoting Connection	.011 (.010)	–	–
Issue 13: Grant Foundations	.042** (.017)	–	–
Issue 14: Mixed Aims	.054* (.026)	–	–
<i>Years of Operation</i>			
From Founding Year to 2011	–	.000* (.000)	–
<i>Internet Connectivity</i>			
Internet bandwidth bits per second per capita	–	–	.003 (.003)
Constant	.256 (.006)	.262 (.005)	.257 (.013)
<i>R</i> ²	.045	.009*	.002

P*<.05 (two-tailed test) *P*<.01 (two-tailed test) *** *P*<.001 (two-tailed test)

a. Issue 11 is the reference group.

Table 21. Unstandardized coefficients from OLS Regressions of (Outgoing Ties) Closeness Centrality in 2011 on Issue Areas, Years of Operation and Internet Connectivity: 509 INGOs.

Independent Variables	Model 21_1	Model 21_2	Model 21_3
<i>Issue Areas</i>			
Issue 1: Sustainable Development	.008 (.014)	–	–
Issue 2: Biodiversity	.034 (.021)	–	–
Issue 3: Animal Rights	.010 (.014)	–	–
Issue 4: Forestry and Plants Protection	.020 (.016)	–	–
Issue 5: Climate Change	.005 (.021)	–	–
Issue 6: Energy	.020 (.028)	–	–
Issue 7: Extractive Industries	.035 (.059)	–	–
Issue 8: Water Resource	-.020 (.014)	–	–
Issue 9: Waste Procession	.040* (.021)	–	–
Issue 10: Indigenous People’s Rights	-.048 (.035)	–	–
Issue 11: Research& Information Sharing	– ^a	–	–
Issue 12: Promoting Connection	.028* (.014)	–	–
Issue 13: Grant Foundations	.029 (.025)	–	–
Issue 14: Mixed Aims	.052 (.038)	–	–
<i>Years of Operation</i>			
From Founding Year to 2011	–	.000 (.000)	–
<i>Internet Connectivity</i>			
Internet bandwidth bits per second per capita	–	–	.001 (.005)
Constant	.268 (.009)	.274 (.007)	.271 (.020)
<i>R</i> ²	.045	.001	.000

P*<.05 (two-tailed test) *P*<.01 (two-tailed test) *** *P*<.001 (two-tailed test)

a. Issue 11 is the reference group.

Table 22. Unstandardized coefficients from OLS Regressions of Betweenness Centrality in 2011 on Issue Areas, Years of Operation and Internet Connectivity: 509 INGOs.

Independent Variables	Model 22_1	Model 22_2	Model 22_3
<i>Issue Areas</i>			
Issue 1: Sustainable Development	13.566 (127.11)	–	–
Issue 2: Biodiversity	1002*** (194.83)	–	–
Issue3: Animal Rights	19.794 (127.70)	–	–
Issue 4: Forestry and Plants Protection	49.180 (146.87)	–	–
Issue 5: Climate Change	24.286 (194.83)	–	–
Issue 6: Energy	-40.715 (257.01)	–	–
Issue 7: Extractive Industries	87.273 (550.74)	–	–
Issue 8: Water Resource	10.568 (133.13)	–	–
Issue 9: Waste Procession	67.154 (194.83)	–	–
Issue 10: Indigenous People's Rights	-56.315 (324.96)	–	–
Issue 11: Research& Information Sharing	– ^a	–	–
Issue 12: Promoting Connection	192.744 (133.91)	–	–
Issue 13: Grant Foundations	-4.720 (228.84)	–	–
Issue 14: Mixed Aims	1226*** (354.08)	–	–
<i>Years of Operation</i>			
From Founding Year to 2011	–	3.904 (2.290)	–
<i>Internet Connectivity</i>			
Internet bandwidth bits per second per capita	–	–	19.199 (47.369)
Constant	56.315 (82.100)	57.429 (69.148)	71.876 (191.33)
R ²	.088***	.007	.000

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Issue 11 is the reference group.

Table 23. Unstandardized coefficients from OLS Regressions of The Number of Website Visitors in 2011 on Issue Areas and Internet Connectivity: 509 INGOs.

Independent Variables	Model 23_1	Model 23_2
<i>Issue Areas</i>		
Issue 1: Sustainable Development	-.007* (.003)	–
Issue 2: Biodiversity	.002 (.005)	–
Issue3: Animal Rights	-.007* (.003)	–
Issue 4: Forestry and Plants Protection	-.006 (.004)	–
Issue 5: Climate Change	-.007 (.005)	–
Issue 6: Energy	-.007 (.006)	–
Issue 7: Extractive Industries	-.007 (.013)	–
Issue 8: Water Resource	-.004 (.003)	–
Issue 9: Waste Proccession	-.006 (.005)	–
Issue 10: Indigenous People’s Rights	-.007 (.008)	–
Issue 11: Research& Information Sharing	– ^a	–
Issue 12: Promoting Connection	.005 (.003)	–
Issue 13: Grant Foundations	-.007 (.006)	–
Issue 14: Mixed Aims	-.003 (.008)	–
<i>Internet Connectivity</i>		
Internet bandwidth bits per second per capita	–	.001 (.001)
Constant	.007 (.002)	.001 (.005)
<i>R</i> ²	.055*	.001

P*<.05 (two-tailed test) *P*<.01 (two-tailed test) *** *P*<.001 (two-tailed test)

a. Issue is the reference group.

Table 24. Unstandardized coefficients from OLS Regressions of The Number of Facebook Followers in 2011 on Issue Areas and Internet Connectivity: 509 INGOs.

Independent Variables	Model 24_1	Model 24_2
<i>Issue Areas</i>		
Issue 1: Sustainable Development	4266.305 (16834)	–
Issue 2: Biodiversity	6836.384 (22793)	–
Issue3: Animal Rights	34340.9* (15314)	–
Issue 4: Forestry and Plants Protection	3530.829 (22793)	–
Issue 5: Climate Change	-539.421 (32188)	–
Issue 6: Energy	710.829 (32188)	–
Issue 7: Extractive Industries	-663.171 (61852)	–
Issue 8: Water Resource	-372.941 (19808)	–
Issue 9: Waste Procession	-14.671 (26947)	–
Issue 10: Indigenous People’s Rights	2889.829 (36688)	–
Issue 11: Research& Information Sharing	– ^a	–
Issue 12: Promoting Connection	1874.940 (17689)	–
Issue 13: Grant Foundations	20765.23 (29157)	–
Issue 14: Mixed Aims	807.829 (44339)	–
<i>Internet Connectivity</i>		
Internet bandwidth bits per second per capita	–	4737.277 (6852.1)
Constant	2.777 (.967)	-10043.7 (28125)
<i>R</i> ²	.047*	.003

P*<.05 (two-tailed test) *P*<.01 (two-tailed test) *** *P*<.001 (two-tailed test)

a. Issue is the reference group.

Table 25. Correlations about independent variables that affect the operating environment of INGOs.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. ISPI	1	.3 **	.2 **	.3 **	.9 **	-.1 **	-.1	-.1	-.1	-.1 **	-.0	-.1 **	-.1 *	-.0	.3 **	-.1 **	.1 **
2. WSP	-	1	.7 **	.9 **	.6 **	.5 **	-.4 **	-.2 **	-.1	-.3 **	.1	-.4 **	-.0	-.1	.8 **	-.5 **	.8 **
3.WSP(Clark & Backfield)	-	-	1	.7 **	.5 **	.4 **	-.5 **	-.0	-.0	-.3 **	.1	-.1 **	-.0	.0	.6 **	-.4 **	.6 **
4. GNI Per capital	-	-	-	1	.6 **	.4 **	-.4 **	-.2 **	-.3 **	-.4 **	.1	-.2 **	-.1	-.1 *	.8 **	-.4 **	.9 **
5. Polity IV	-	-	-	-	1	.3 **	-.2 **	-.2 **	-.0	-.4 **	.1	-.1 **	-.1 **	-.4 **	.6 **	-.2 **	.5 **
6. World Polity Ties	-	-	-	-	-	1	-.2 **	-.1 *	-.1	-.2 **	-.1 *	-.2 **	-.1 **	-.1	.5 **	-.2 **	.3 **
7. Culture-African	-	-	-	-	-	-	1	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.3 **	-.0 **	-.5 **
8. Culture-Buddhist	-	-	-	-	-	-	-	1	-.0	-.0	-.0	-.0	-.0	-.0	-.2 **	-.0	-.2
9. Culture-Hindu	-	-	-	-	-	-	-	-	1	-.0	-.0	-.0	-.0	-.0	-.2 **	-.0	-.3 **
10. Culture-Islamic	-	-	-	-	-	-	-	-	-	1	-.0	-.0	-.0	-.0	-.3 **	-.0	-.3 **
11. Culture-Japanese	-	-	-	-	-	-	-	-	-	-	1	-.0	-.0	-.0	-.3 **	-.0	-.0
12. Culture-LatinAmeric	-	-	-	-	-	-	-	-	-	-	-	1	-.0	-.0	-.4 **	-.0	-.3 **
13. Culture-Orthodox	-	-	-	-	-	-	-	-	-	-	-	-	1	-.0	-.2 **	-.0	-.1 *
14. Culture-Sinic	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-.2 **	-.0	-.0
15. Culture-Western	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-.4 **	.8 **
16. Culture-Others	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-.3 **
17. Internet Connectivity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

Table 26. The combined effect of IVs on network centrality measures including indegree centrality, outdegree centrality, closeness centrality and betweenness centrality.

		Indegree centrality	Outdegree Centrality	(Incoming Ties) Closeness Centrality	(Outgoing Ties) Closeness Centrality	Betweenness Centrality
<i>World System Position</i>						
	ISPI	.034 (.128)	-.101 (.481)	.001 (.001)	.000 (.001)	6.252 (11.247)
	Core	— ^a	— ^a	— ^a	— ^a	— ^a
	Semi-Periphery	-2.837 (2.939)	5.116 (11.077)	-.019 (.018)	-.006 (.026)	-84.403 (258.762)
	Periphery	-4.969 (4.307)	-12.261 (16.233)	-.011 (.026)	.011 (.039)	371.486 (379.197)
<i>Economic Development</i>						
	GNI per capita, 2011	5.095 (3.621)	26.788* (13.649)	.033 (.022)	.083** (.033)	818.451** (318.846)
<i>Democracy Level</i>						
	Polity IV, 2011	-.167 (.373)	1.773 (1.406)	-.004 (.002)	.003 (.003)	-4.257 (32.837)
<i>World Polity Ties</i>						
	Number of INGOs	-.036 (.050)	-.018 (.190)	.000 (.000)	-.000 (.000)	-5.726 (4.429)
<i>Civilization</i>						
	African	-1.548 (5.027)	68.964*** (18.948)	.040 (.030)	.033 (.045)	-13.204 (442.631)
	Buddhist	1.083 (5.146)	27.795 (19.397)	.025 (.031)	.010 (.046)	-169.750 (453.130)
	Hindu	-1.670 (6.769)	19.703 (25.512)	.047 (.041)	.075 (.061)	441.660 (595.953)
	Islamic	.937 (4.421)	30.593 (16.664)	.023 (.027)	.087* (.040)	192.383 (389.273)
	Japanese	-3.866 (3.519)	-.388 (13.264)	.029 (.020)	.039 (.030)	-170.302 (298.043)
	Latin American	3.430 (3.966)	30.117* (14.950)	.050* (.024)	.037 (.036)	31.710 (349.238)
	Orthodox	-3.853 (3.851)	2.821 (14.517)	.024 (.023)	-.001 (.035)	-89.516 (339.112)
	Sinic	-4.540 (9.401)	37.557 (35.435)	-.008 (.057)	.027 (.085)	142.956 (827.750)
	Western	— ^b	— ^b	— ^b	— ^b	— ^b

Others	12.511**	48.453*	.065*	.043	699.266
	(5.013)	(18.895)	(.030)	(.045)	(441.387)
<i>Issue Areas</i>					
1: Sustainable Development	1.739	-.047	.020*	.013	35.315
	(1.638)	(6.173)	(.010)	(.015)	(143.907)
2: Biodiversity	7.633**	19.865*	.022	.042*	1050.782***
	(2.405)	(9.066)	(.015)	(.022)	(211.719)
3: Animal Rights	.286	9.178	.003	.018	-18.197
	(1.681)	(6.334)	(.010)	(.015)	(147.888)
4: Forestry and Plants Protection	.407	-4.116	-.004	.018	19.102
	(1.899)	(7.158)	(.011)	(.017)	(167.021)
5: Climate Change	2.563	-.056	.003*	.009	67.835
	(2.401)	(9.048)	(.015)	(.022)	(211.055)
6: Energy	1.004	-6.353	-.003	.029	-35.588
	(3.147)	(11.861)	(.019)	(.028)	(277.029)
7: Extractive Industries	.504	2.463	.021	.038	84.920
	(6.613)	(24.926)	(.040)	(.060)	(582.233)
8: Water Resource	3.081	-.153	.027**	-.005	38.292
	(1.799)	(6.781)	(.011)	(.016)	(158.203)
9: Waste Proccession	2.406	3.700	.018	.052*	100.674
	(2.513)	(9.473)	(.015)	(.023)	(221.211)
10: Indigenous People's Rights	-3.465	-5.010	.001	-.032	-152.918
	(4.396)	(16.570)	(.027)	(.040)	(387.068)
11: Research & Information	— ^c	— ^c	— ^c	— ^c	— ^c
12: Promoting Connection	3.232	4.917	.009	.036*	167.371
	(1.792)	(6.755)	(.011)	(.016)	(157.694)
13: Grant Foundations	2.291	3.217	.033	.019	96.927
	(3.083)	(11.620)	(.019)	(.028)	(271.387)
14: Mixed Aims	14.137**	4.189**	.059*	.051	1652.307***
	(4.891)	(18.436)	(.030)	(.044)	(430.617)
<i>Years of Operation</i>					
From the Founding Year to 2011	.078**	-.053**	.000**	.000	4.589
	(.028)	(.106)	(.000)	(.000)	(2.484)
<i>Internet Connectivity</i>					
Internet bandwidth bits /second/ capita	-3.148	-7.681	.001	-.034*	-270.930
	(1.930)	(7.276)	(.012)	(.017)	(169.978)
Constant	-5.735	-104.981	.130	-.006	-2447.820
	(15.222)	(57.373)	(.092)	(.137)	(1340.200)
R^2	.118*	.119*	.094	.096	.141***

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Core country is the reference group.

b. Western culture is the reference group.

c. Issue 11 is the reference group.

Table 27. The combined effect of IVs on number of website visitors and number of Facebook followers.

	Number of Website Visitors	Number of Facebook Followers
<i>World System Position</i>		
ISPI	.000 (.000)	-1650.763 (1814.587)
Core	— ^a	— ^a
Semi-Periphery	-.007 (.008)	-5580.994 (56993.266)
Periphery	-.001 (.011)	59248.464 (82529.483)
<i>Economic Development</i>		
GNI per capita, 2011	-.003 (.009)	64617.799 (58233.310)
<i>Democracy Level</i>		
Polity IV, 2011	.000 (.001)	6537.717 (12710.936)
<i>World Polity Ties</i>		
Number of INGOs	.000 (.000)	326.525 (666.066)
<i>Civilization</i>		
African	.002 (.013)	4840.015 (113554.455)
Buddhist	.000 (.013)	56507.831 (113999.494)
Hindu	.001 (.016)	69904.169 (128888.714)
Islamic	.012 (.011)	67429.840 (88407.984)
Japanese	-.007 (.007)	-2581.931 (43633.077)
Latin American	.000 (.011)	-29710.909 (110549.433)
Orthodox	-.006 (.010)	-.006 (1378.331)
Sinic	.011 (.027)	.011 (93890.358)
Western	— ^b	— ^b
Others	-.002 (.012)	-2961.414 (.119378.348)

<i>Issue Areas</i>		
1: Sustainable Development	-.009* (.004)	8347.887 (20411.544)
2: Biodiversity	.002 (.005)	2561.659 (26449.566)
3: Animal Rights	-.007 (.004)	43232.851 (19740.972)
4: Forestry and Plants Protection	-.008 (.005)	6636.319 (28173.759)
5: Climate Change	-.009 (.005)	-2349.539 (36606.384)
6: Energy	-.006 (.007)	3996.208 (38119.214)
7: Extractive Industries	-.009 (.014)	-3496.172 (69803.432)
8: Water Resource	-.005 (.004)	-2126.259 (24252.224)
9: Waste Procession	-.007 (.005)	7209.178 (32144.309)
10: Indigenous People's Rights	-.006 (.010)	13621.750 (42576.183)
11: Research & Information	– ^c	– ^c
12: Promoting Connection	.006 (.004)	-3898.331 (22067.865)
13: Grant Foundations	-.008 (.007)	38379.222 (36722.522)
14: Mixed Aims	-.003 (.010)	3387.029 (49166.523)
<i>Years of Operation</i>		
From the Founding Year to 2011	.000 (.000)	162.687 (281.821)
<i>Internet Connectivity</i>		
Internet bandwidth bits per second per capita	.002 (.005)	-17102.823 (38465.880)
Constant	.012 (.037)	-287605.813 (272096.125)
R^2	.094	.093

* $P < .05$ (two-tailed test) ** $P < .01$ (two-tailed test) *** $P < .001$ (two-tailed test)

a. Core country is the reference group.

b. Western culture is the reference group.

c. Issue 11 is the reference group.

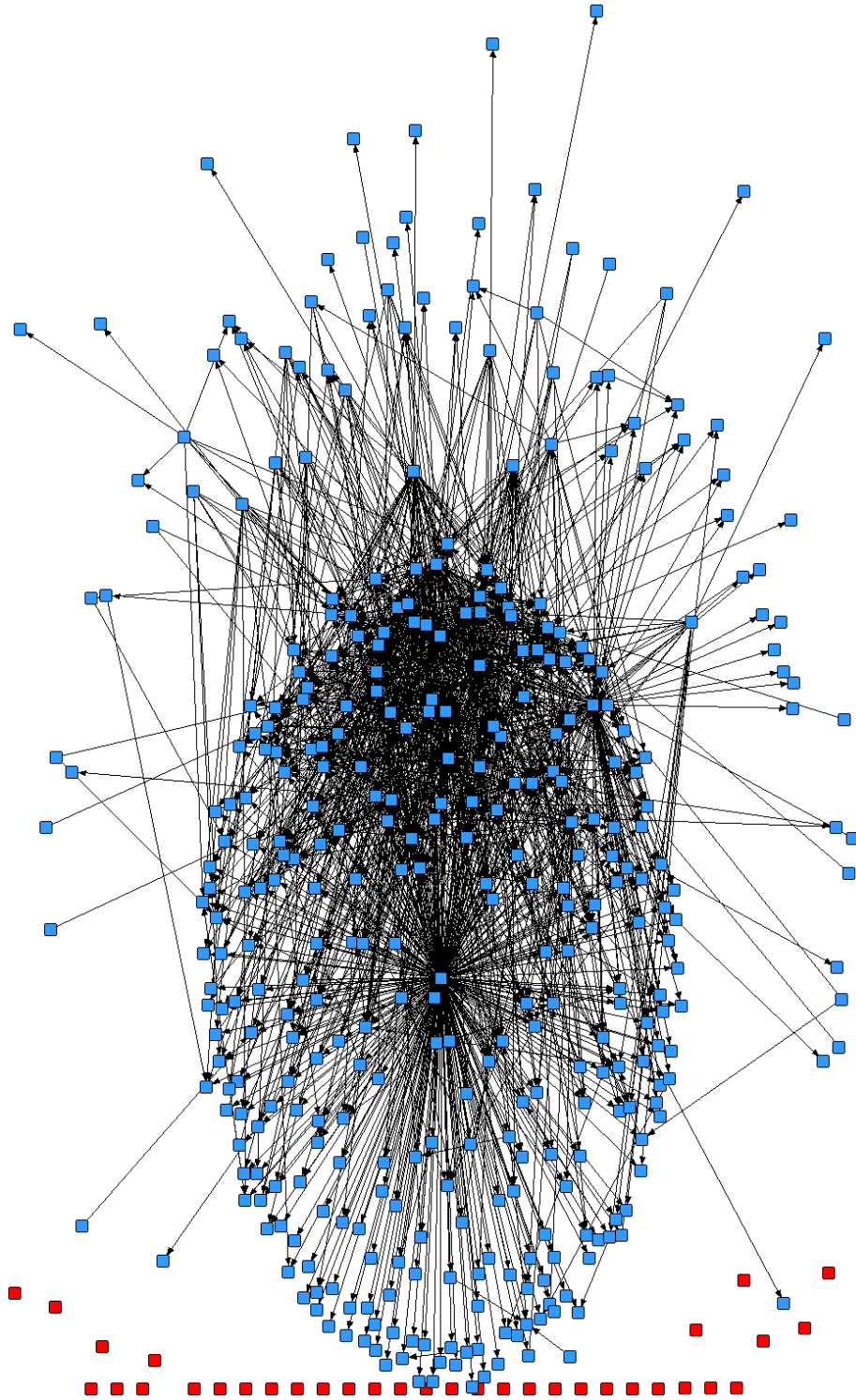
Table 28. Summary of findings.

	Major Findings
<i>Research Questions</i>	
RQ2	The economic development level of an INGO's country-of-origin did not affect the INGO's virtual network centrality.
RQ3	The democracy level of an INGO's country-of-origin did not affect the INGO's virtual network centrality.
RQ4	Countries' world system positions do not have a significant impact on an INGO's <i>k</i> -core membership.
RQ5	The civilization type of an INGO's country-of-origin affect the INGO's virtual network centrality.
RQ6	The world polity ties of an INGO's country-of-origin do not have a significant impact on the environmental INGO's virtual network centrality.
RQ7	Environmental INGO's issue areas affect INGOs' number of website visitors.
RQ8	INGOs' issue areas affect environmental INGOs' number of Facebook Followers.
RQ9	Environmental INGO's years of operation affect INGOs' virtual network centrality.
RQ10	Environmental INGO's years of operation affect INGOs' virtual component structure.
RQ11	Internet connectivity of an environmental INGO's country-of-origin do not affect the INGO's number of website visitors.
RQ12	Internet connectivity of an environmental INGO's country-of-origin do not affect the INGO's number of Facebook followers.
RQ13	INGOs' years of operating significantly affect component structure of the environmental INGOs' online communication network
<i>Hypotheses</i>	
H1	Supported. The structure of environmental INGOs' virtual communication network presents a core-peripheral pattern.
H2	Rejected. Network measures of individual organizational

	websites' centrality were not sensitive to the world system position of each organization's country-of-origin.
H3	Rejected. Countries' world system positions did not significantly affect the number of visitors each website can attract.
H4	Supported. The component structure of the environmental INGOs' network is significantly influenced by the civilization types of environmental INGOs' countries-of-origin.
H5	Rejected. World polity ties do not affect on the number of website visitors and Facebook followers.
H6	Supported. The component structure of environmental INGOs' virtual network is significantly influenced by environmental INGOs' issue areas.
H7	Rejected. The Internet connectivity of environmental INGOs' countries-of-origin significantly affect environmental INGOs' virtual network centrality.

Appendix B – Figures

Figure 1. The Overall Structure of the 509 Environmental INGOs' Network.



*Nodes in blue are connected INGOs; nodes in red are isolated.

Figure 2. International INGOs' Virtual Network Structure 2011: Metric Multidimensional Scaling, Two Dimensions.

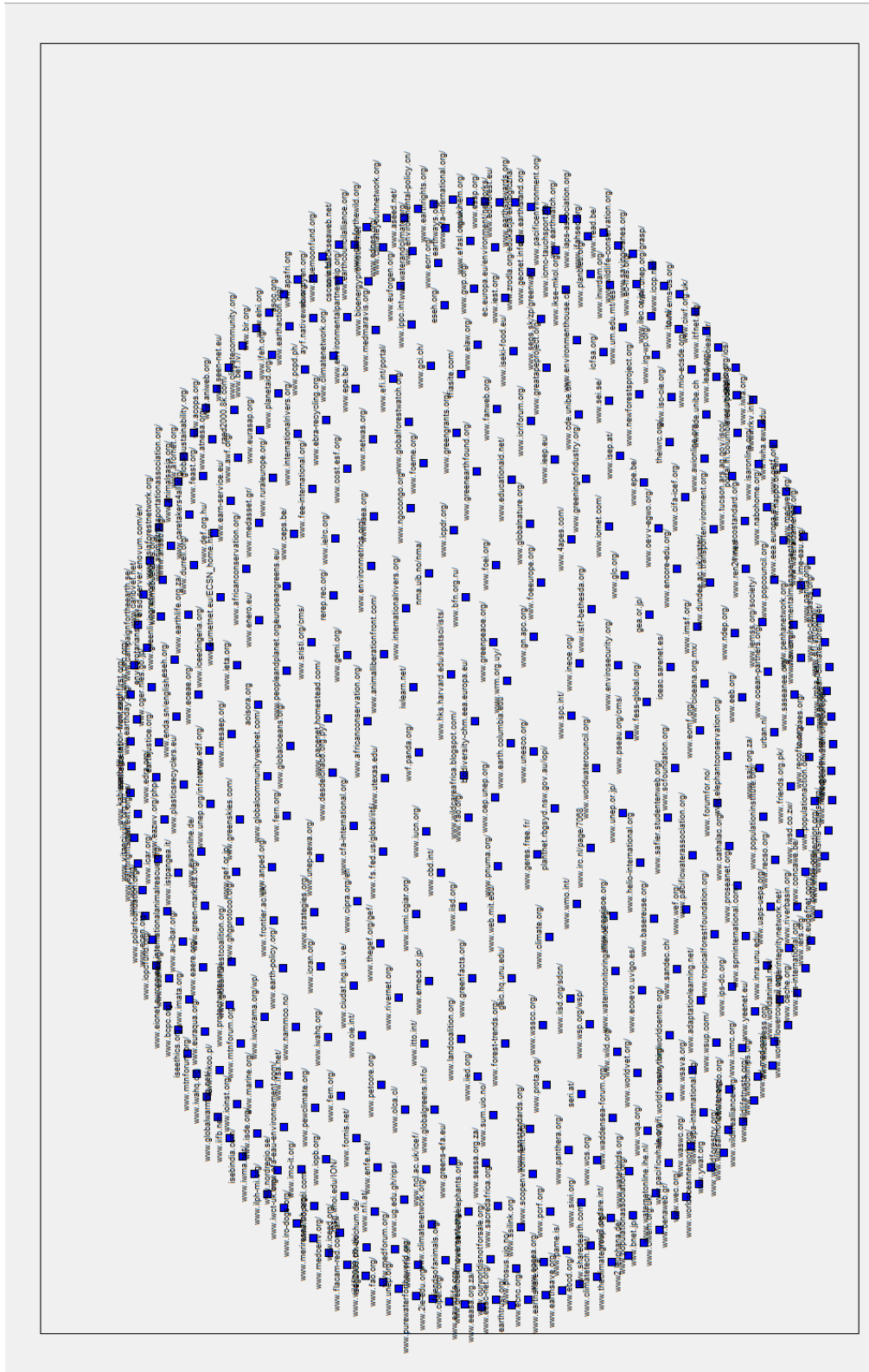


Figure 3. The overall structure of the indegree centrality of the network (each node size is proportionate to its indegree centrality).

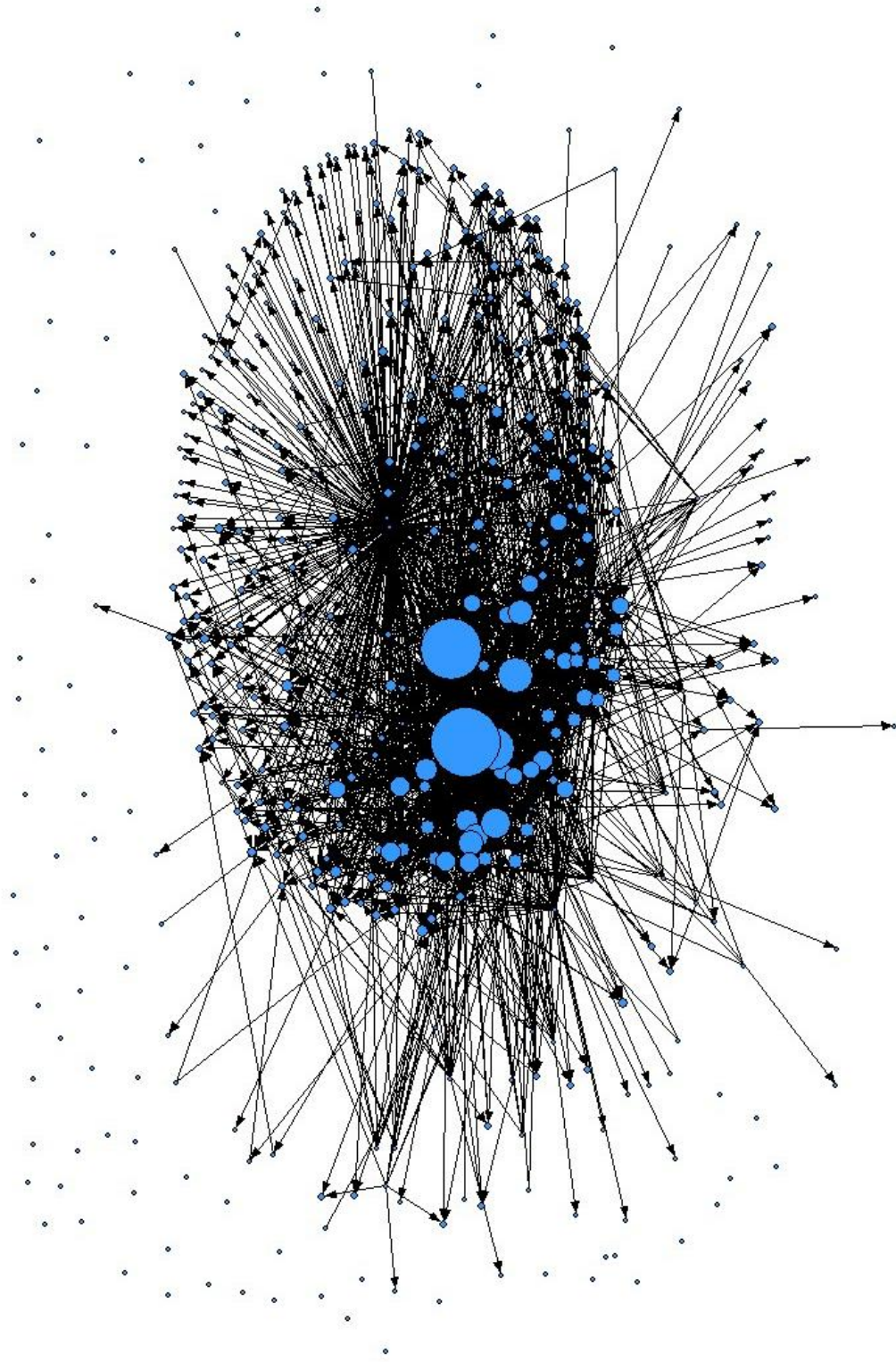


Figure 4. The 15 nodes with the largest indegree centrality.

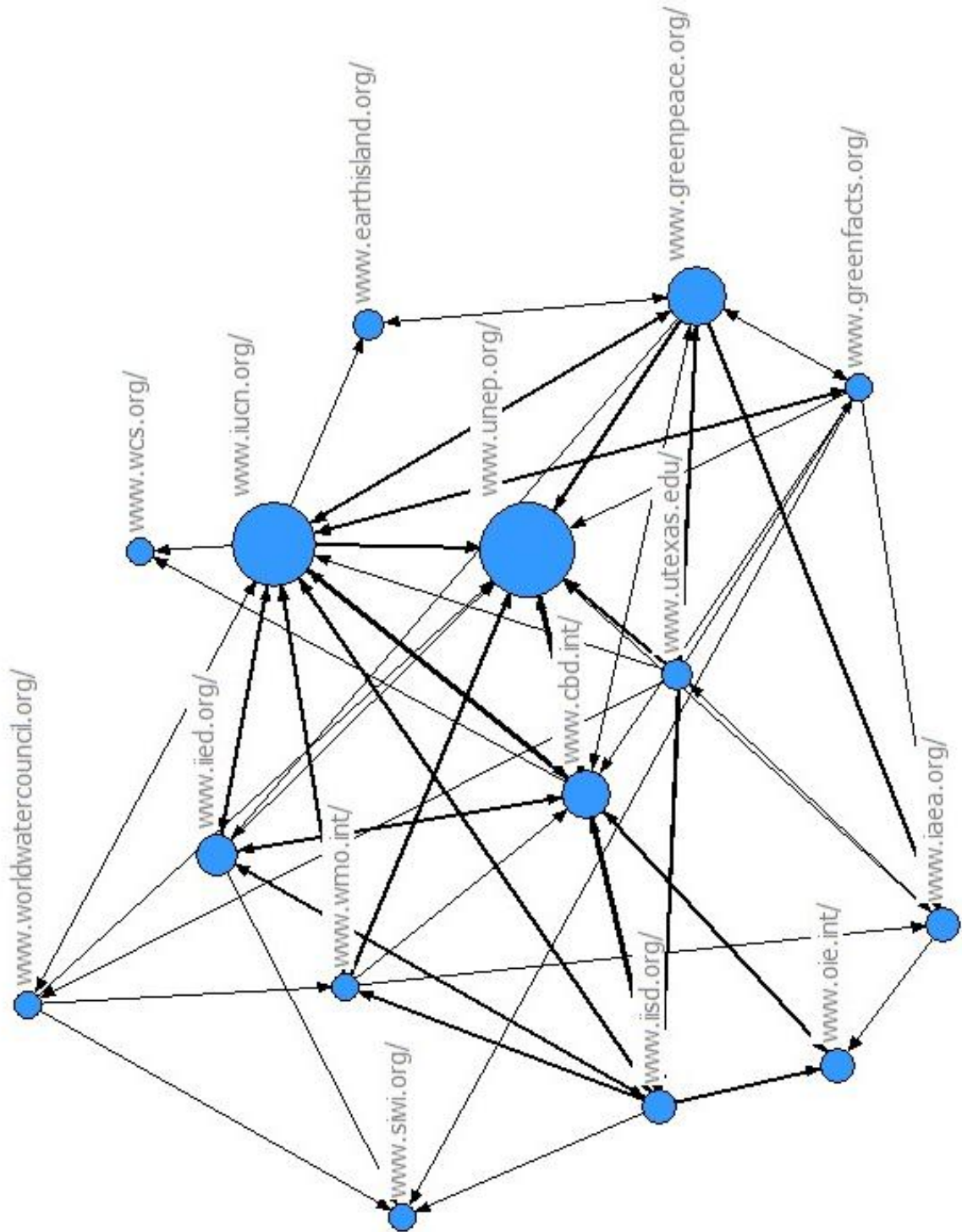


Figure 5. The overall structure of the outdegree centrality of the network (each node size is proportionate to its outdegree centrality).



Figure 6. The 22 nodes with the largest outdegree centrality.

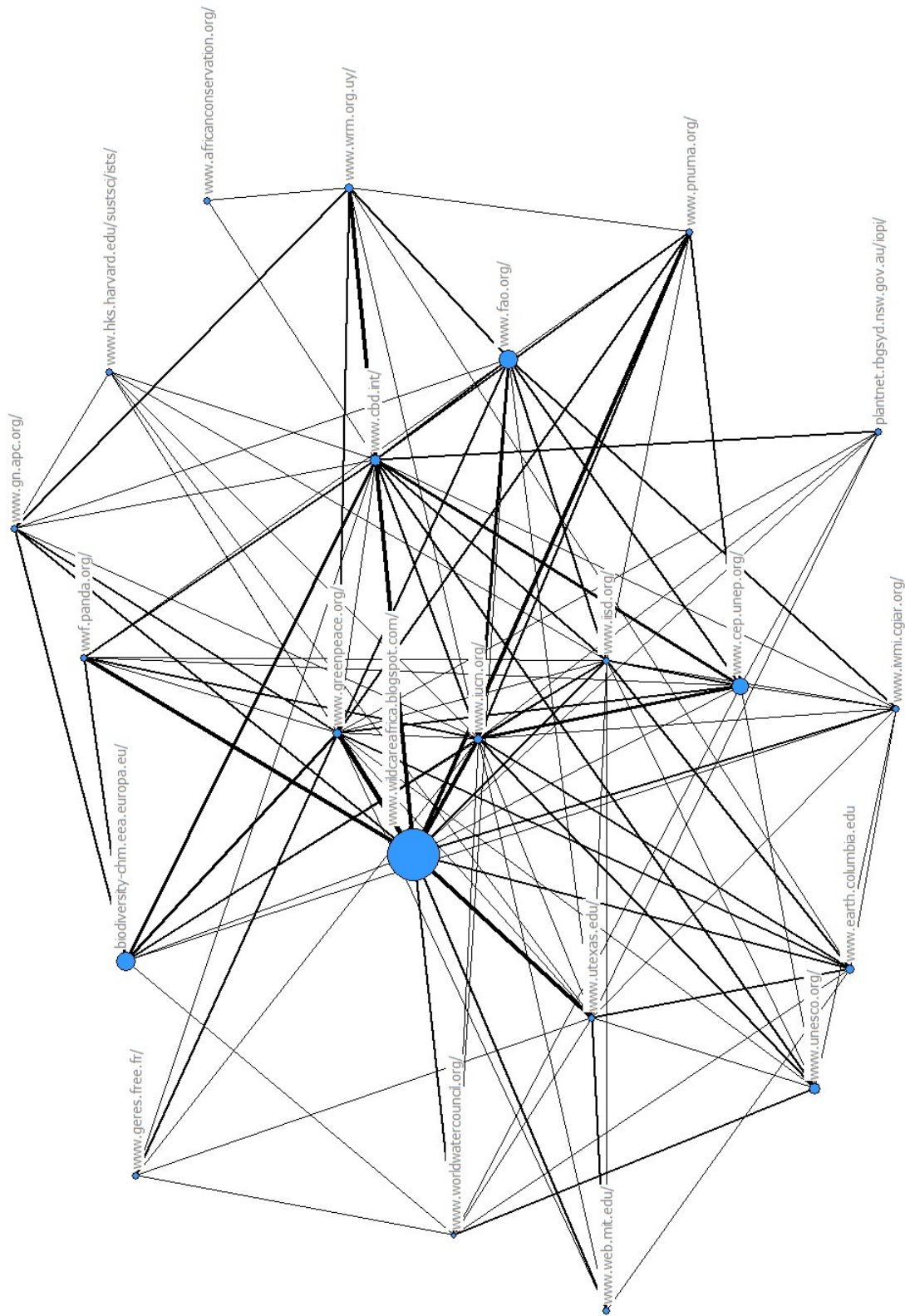


Figure 7. The overall structure of the (incoming ties) closeness centrality of the network (each node size is proportionate to its closeness centrality).

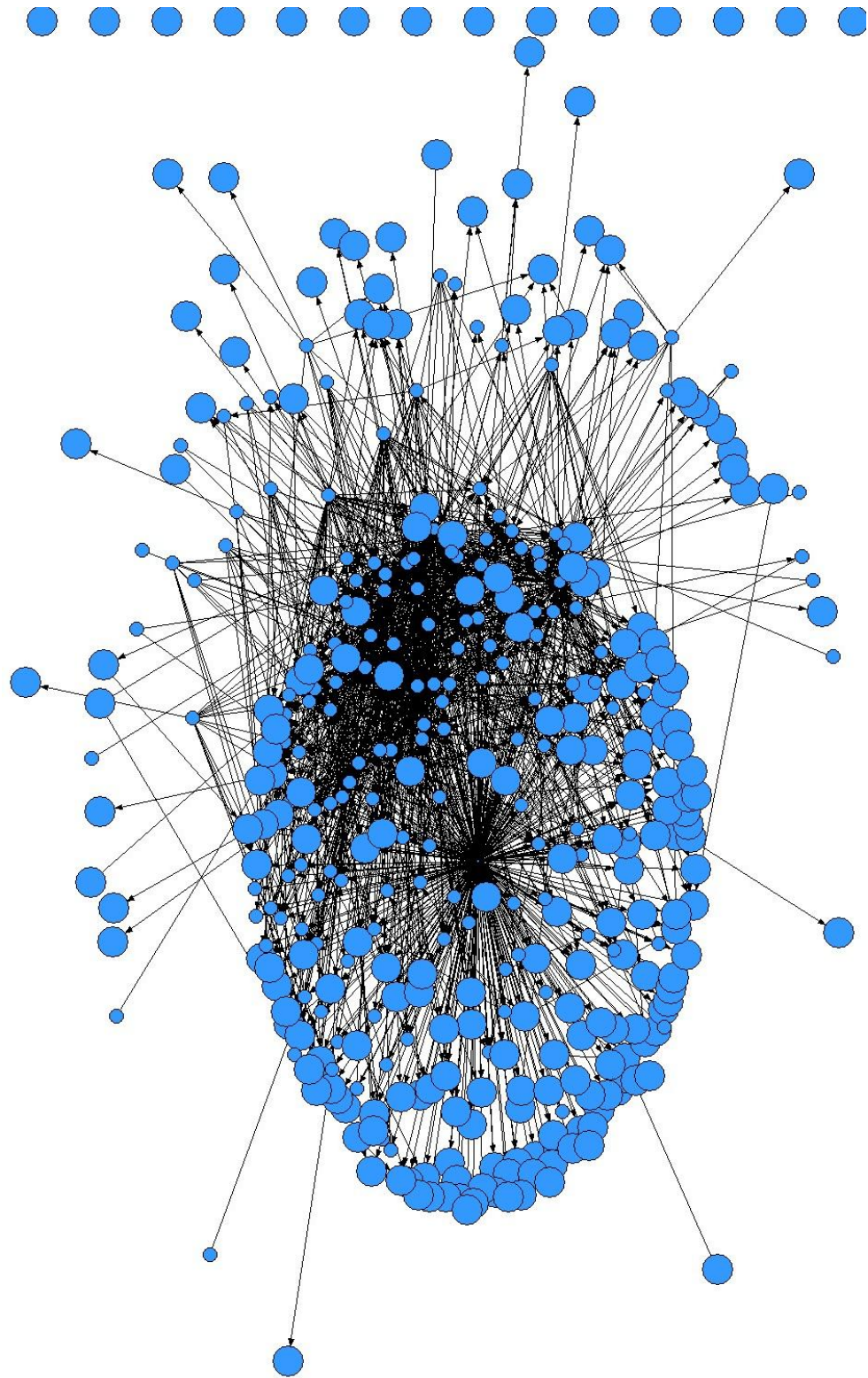


Figure 8. The overall structure of the (outgoing ties) closeness centrality of the network (each node size is proportionate to its closeness centrality).

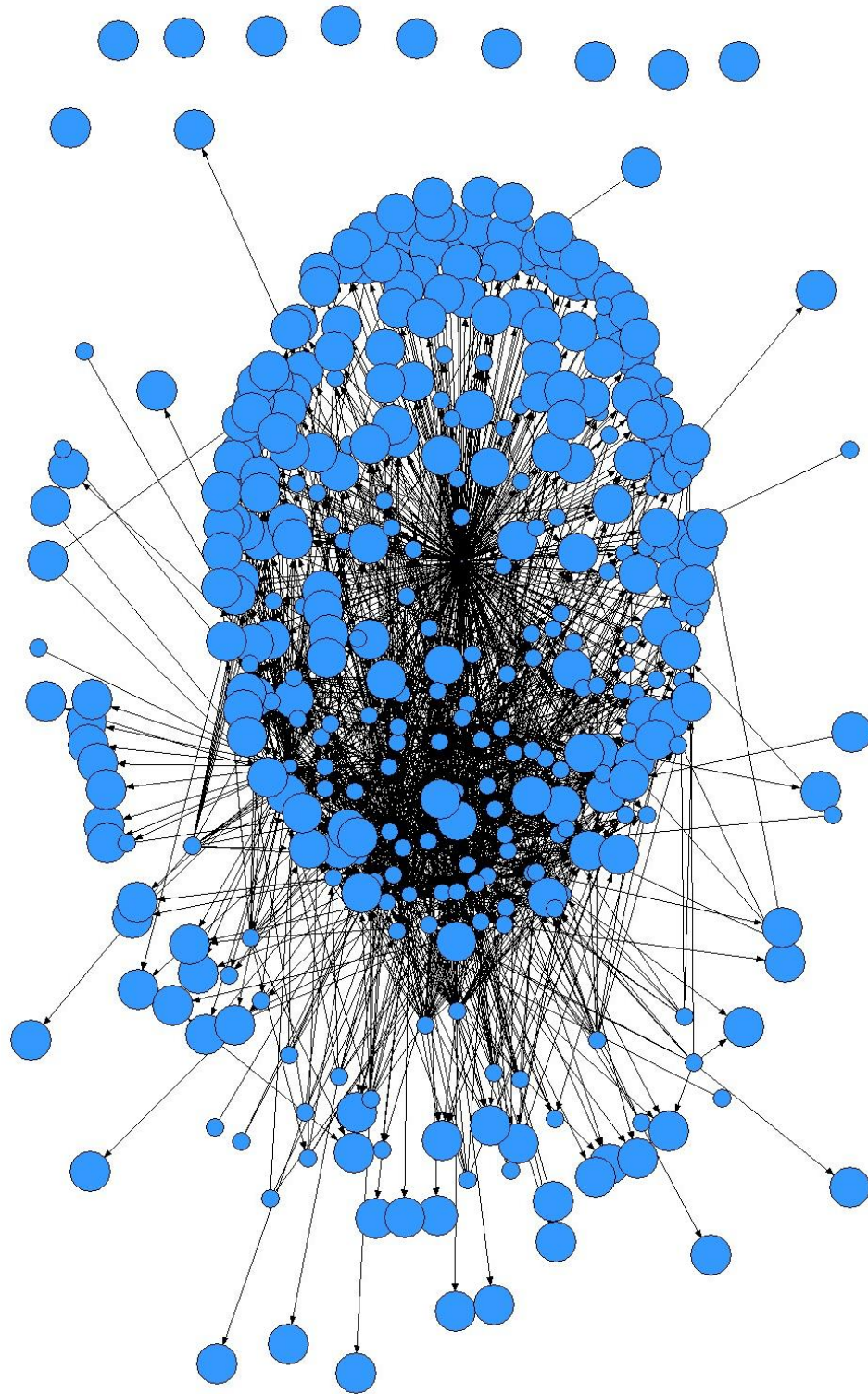


Figure 9. The overall structure of betweenness centrality of the network (each node size is proportionate to its betweenness centrality).

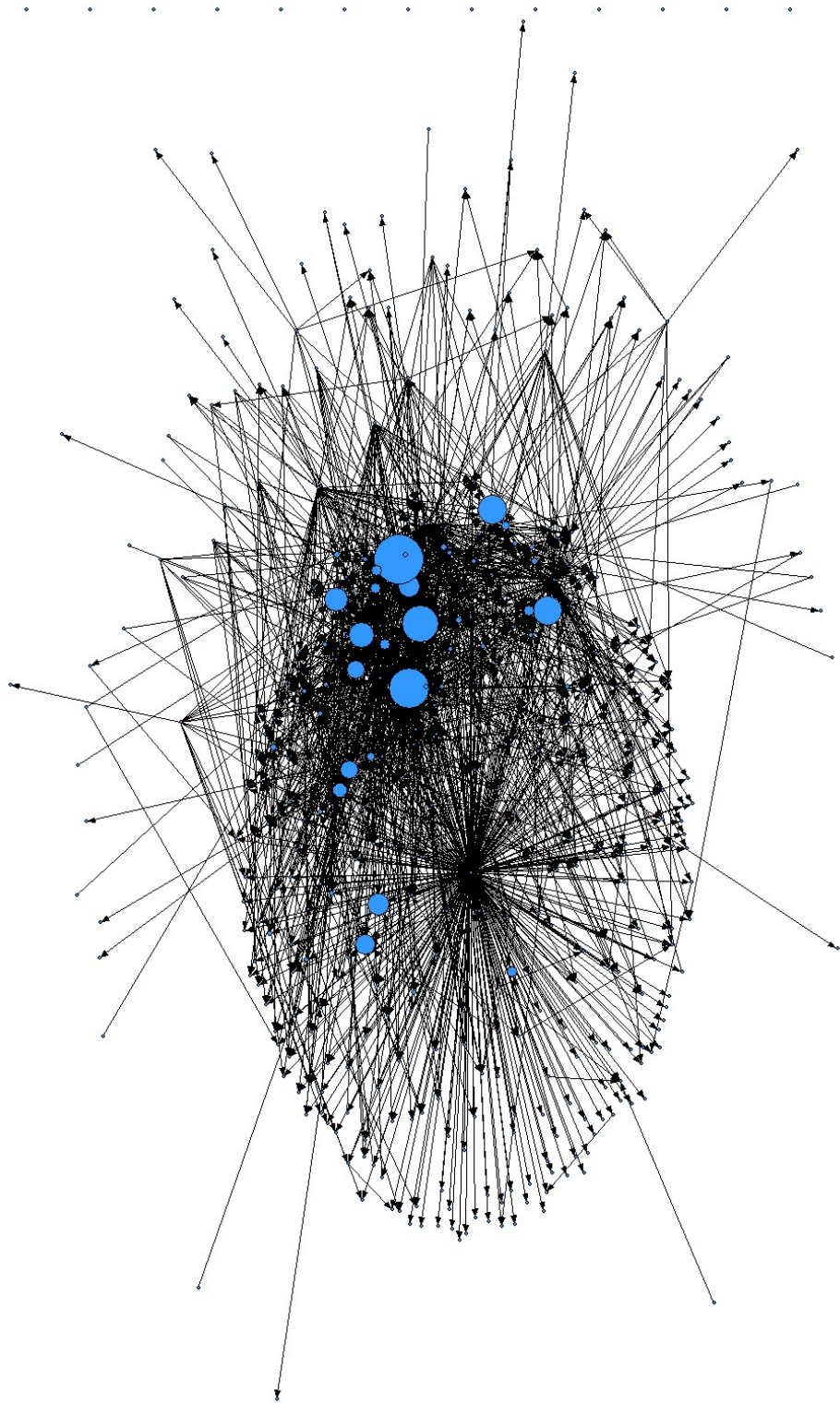


Figure 10. The overall structure of k-core membership.

