平成 29 年度
エネルギー政策・言説の日独地域比較
Comparative Energy Policy and Discourse in Japan and Germany
研究報告書
Research Results Compilation

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2018 年 1 月
January 2018

独立行政法人日本学術振興会　課題設定による先導的人文学・社会科学研究推進事業領域
開拓プログラム「エネルギー政策・言説の日独地域比較」
JSPS Topic-Setting Program to Advance Cutting-Edge Humanities and Social Sciences Research, Area Cultivation “Comparative Energy Policy and Discourse in Japan and Germany”
（平成 26 年 10 月から平成 30 年 3 月、話題番号　AAD26048）研究報告書
（October 2014 to March 2018, Project ID: AAD26048) Research Results Compilation

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Foreword

I am pleased to present this compilation of our research results for the Japan Society for the Promotion of Science Topic-Setting Program to Advance Cutting-Edge Humanities and Social Sciences Research, Area Cultivation, "Comparative Energy Policy and Discourse in Japan and Germany" during the period from October 2014 to March 2018.

We are deeply grateful to the Japan Society for the Promotion of Science for their generous funding of our project. We believe that our current results demonstrate our progress in researching the important issue of climate and environmental change, policy networks in a comparable perspective, and information and communications strategies for communicating policy change through various media formats.

I would also like to thank our qualitative and quantitative research groups for their steadfast endeavors before and during the project period. I hope that we will continue our collaboration in research papers and printed volumes in this research area.

Thank you for your support of our project.

Leslie Tkach-Kawasaki

Introduction: The CEDP Project

Leslie Tkach-Kawasaki, University of Tsukuba, Japan

The Comparative Energy Discourse Policy Project (formal English title: "Comparative Energy Policy and Discourse in Japan and Germany") is a three-year project funded by the JSPS (Japan Society for the Promotion of Science) Topic-Setting Program to Advance Cutting Edge Humanities and Social Sciences Research (Area Cultivation) from October 1, 2014 to March 31, 2018.

In a broad sense, our project aimed at investigating the relationship between energy policy and information/communications structures. Our starting point was a comparative analysis between Japan and Germany, using the J-GEPON (Japan Global Environmental Policy Network Survey) created by Professor Yutaka Tsujinaka and administered in Japan in two waves, first in the late 1990s and then again in 2012-13. A German version of the survey (G-GEPON) was undertaken in the early 2000s, and within the CEDP project, a second wave was undertaken in 2016-17.

Our aims for the project were as follows. First, to examine and investigate the nature of energy policy through national comparisons on local, regional, and national levels. We also sought to discover actor networks through network analysis that would not have been readily apparent through traditional survey approaches. As a second aim, we explored how new media has been used by different environmental actors as a communications and information provision tool, and compared aspects of new media use with traditional survey data. Finally, through the comparison between Japan and Germany, we have sought to uncover the similarities and differences in energy policy in the hopes of creating a model that can be used in the future for international comparisons at the country level. Our research plan conceptualization is shown in Figure 1.

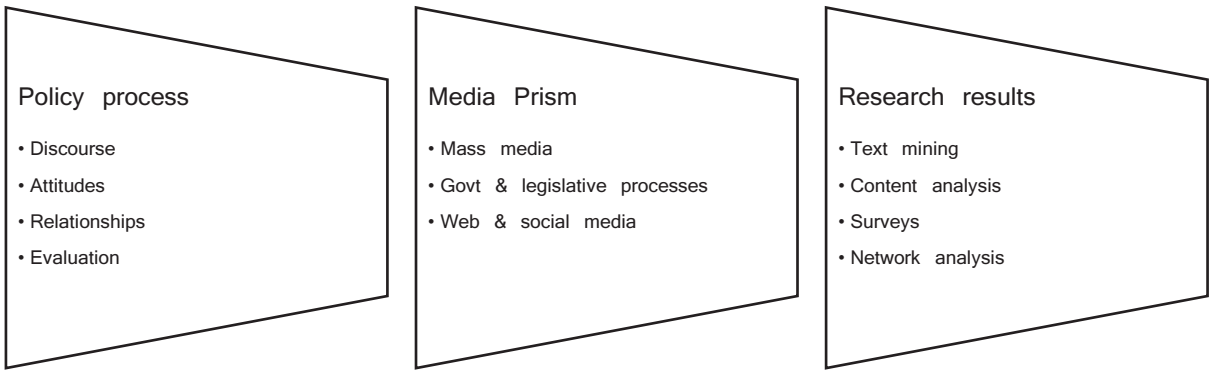

Figure 1 CEDP Project Objectives

Project Funding

Our project received the following funding from the Japan Society for the Promotion of Science, Topic-Setting Program to Advance Cutting Edge Humanities and Social Sciences Research (Area Cultivation).

Table 1 Project Funding

Period	Funding
October 2014 to March 2015	1,450,000 yen
April 2015 to March 2016	3,391,000 yen
April 2016 to March 2017	3,196,000 yen
April 2017 to September 2017	3,126,000 yen

Acknowledgements

We would like to thank the Japan Society for the Promotion of Science, our researcher teams within Japan as well as Germany, our survey team for the G-GEPON 2 Survey in Germany, and the graduate students at the University of Tsukuba and the Free University of Berlin who helped us at various times throughout the project's duration.

Leslie Tkach-Kawasaki
January 2018

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Analysis of the Policy Network for the "Feed-in Tariff Law" in Japan
Evidence from the GEPON Survey[1]

Sae OKURA
Leslie TKACH-KAWASAKI
Yohei KOBASHI
Manuela HARTWIG
Yutaka TSUJINAKA

Energy policy is known to have higher path dependency among policy fields and is a critical component of the infrastructure development undertaken in the early stages of nation building. Actor roles are firmly formed, making it unlikely that institutional change can be implemented. In resource-challenged Japan, energy policy is an especially critical policy area for the Japanese government. In comparing energy policy making in Japan and Germany, Japan's policy community is relatively firm, and it is improbable that institutional change can occur.

The Japanese government's approach to energy policy has shifted incrementally in the past half century, with the most recent being the 2012 implementation of the "Feed-In Tariff Law" (Act on Special Measures Concerning Procurement of Renewable Electric Energy by Operators of Electric Utilities), which encourages new investment in renewable electricity generation and promotes the use of renewable energy. Yet, who were the actors involved and the factors that influenced the establishment of this new law?

This study attempts to assess the factors associated with implementing the law as well as the roles of the relevant major actors. In answering this question, we focus on identifying the policy networks among government, political parties, and interest groups, which suggests that success in persuading key economic groups could be a factor in promoting the law.

The strength of our research lays in our focus on political networks and their contributing mechanism to the law's implementation through analysis of the political process. From an academic perspective, identifying the key actors and factors may be significant in explaining institutional change in policy areas with high path dependency. Close examination of this issue also has implications for a society that can promote renewable and sustainable energy resources.

Introduction

Since the Great East Japan Earthquake occurred on March 11, 2011, energy policy has become a hotly debated policy field throughout the world. Particularly in Japan, the discourse concerning energy policy has evolved into multiple policy trajectories with competing preferences. On one hand, there are assertions that even though Japan experienced a major accident involving nuclear power, policy concerning nuclear power has not evolved into complete de-nuclearization. Proponents of this policy who are concerned about maintaining Japan's economy claim that there is a need for Japan to re-open

[1] Originally published in the *Journal of Contemporary Eastern Asia*, 15:1, 41-63, April 2016. Permission was received from the *Journal of Contemporary Eastern Asia* to include this paper in our research results compilation.

the nuclear energy power plants that were shut down shortly after the March 11, 2011 nuclear accident at the Fukushima Dai'ichi nuclear power plant. On the other hand, there are critics of this policy line who advocate serious consideration of the development of safe, non-nuclear energy resources and who assert that expanding new sources of energy will provide tremendous benefits to the country in the future.

From a theoretical point of view, among the various policy fields that are intrinsic to creating national policies, energy policy is arguably the most important and is said to have a higher path dependency compared to other policy areas (Kuper and van Soest, 2003; OECD, 2012, Kikkawa, 2013). Determining energy policy, which is strongly connected to a nation's economic growth and political stability, requires inputs from multiple actors, identifying current energy needs, and forecasting future requirements. Yet, despite the possibilities for fluid and abrupt change owing to extenuating circumstances, actor roles, such as those played by interest groups, are firmly formed, making it unlikely that institutional change can be implemented (Hartwig et al., 2015).

In resource-challenged Japan, energy policy is an especially critical policy area for the Japanese government. In comparing energy policy creation in Japan and Germany, where the accident at the Fukushima Dai'ichi nuclear power plant had a major impact on energy policy, the range of actors in Japan's policy community is relatively stable (Hartwig et al., 2015). Furthermore, the Japanese government's approach to energy policy has shifted incrementally in the past half century, with the most recent being the 2012 implementation of the "Feed-In Tariff Law" (Act on Special Measures Concerning Procurement of Renewable Electric Energy by Operators of Electric Utilities), which encourages new investment in renewable electricity generation and promotes the use of renewable energy. Yet, who were the actors involved and the factors that influenced the establishment of this new law?

This study attempts to assess the factors associated with implementing the law as well as the roles of the relevant major actors. In answering this question, we focus on identifying the policy networks among government, political parties, and interest groups, which suggests that success in persuading key economic groups could be a factor in promoting the law.

1. Background of renewable energy in Japan

(1) Legal framework promoting renewable energy in Japan

Japan's energy policy is regulated under the Basic Act on Energy Policy (promulgated in June 2002) that was enacted in order to ensure basic policy for energy resource utilization, and each energy resource, including nuclear energy and renewable energy, is regulated under this law.

In addition, utilization of renewable energy resources is regulated under "Sophisticated Methods of Energy Supply Structures" which aims at promoting the use of the renewable energy resources by energy supply companies. Renewable energy includes non-fossil energies that can be used sustainably (Article 2.3). More specifically, solar energy, wind power energy, low-head hydro power, geothermal energy, aerothermal energy, earth thermal energy, and other types of renewable energy resources are included under this law (Decree Article 4).

New energy types that refer to one of the renewable energy resources are regulated under the "Law Concerning Special Measures to Promote the Use of New Energy (New Energy Law)" which aims at promoting the use of new energy resources that are comparably not as widespread. Due to their relative novelty and development costs, it is disadvantageous for energy companies to invest heavily in these resources at this time because of the high costs in supplying such resources initially borne by energy supply companies. More specifically, such new energy resources defined under this law include solar energy, wind power energy, solar thermal application, temperature difference energy, waste power energy and biomass energy.

(2) Historical Background

Figures 1 and 2 show shifts in domestic demand for primary energy supply in Japan. As Figure 2 shows, fossil energy resources, such as crude oil, coal and natural gas, have been used traditionally as the main energy resources in Japan. For example, crude oil, coal and natural gas provided 92.1% of Japan's primary energy supply during 2012. On the other hand, renewable energy, such as hydro power

and geothermal energy, make up a smaller portion of Japan's energy supply (7.2% of primary energy supply in 2012). As shown, nuclear energy provided only 0.7%, and this low figure is due to the suspension of almost all nuclear energy generating plants after the Fukushima Dai'ichi incident in March 2011. However, prior to suspending operations in the plants, nuclear power provided approximately 10% of Japan's primary energy supply from the end of the 1980s to 2010. In other words, Japan's energy supply structure has been composed mainly of fossil-fuel energy sources, and nuclear energy and renewable energy have been used as a secondary resource base to accommodate any shifts in primary energy supply for domestic demand.

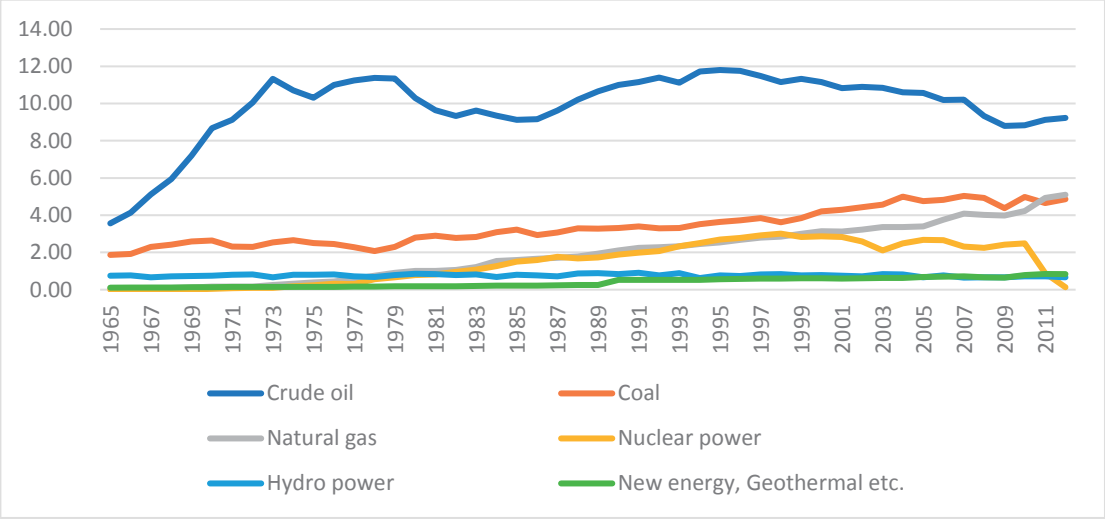

Figure 1: Resource shifts in Japan's domestic energy supply, 1965 to 2011 (Unit: 1018J)
Source: Ministry of Economy, Trade and Industry (Ed.) (2014). *The Cabinet Approved the 2014 Annual Report on Energy (Japan's Energy White Paper 2014)*, Figure 211-3-1 (http://www.enecho.meti.go.jp/about/whitepaper/2014html/2-1-1.html). (Access Date: 2015/09/24)

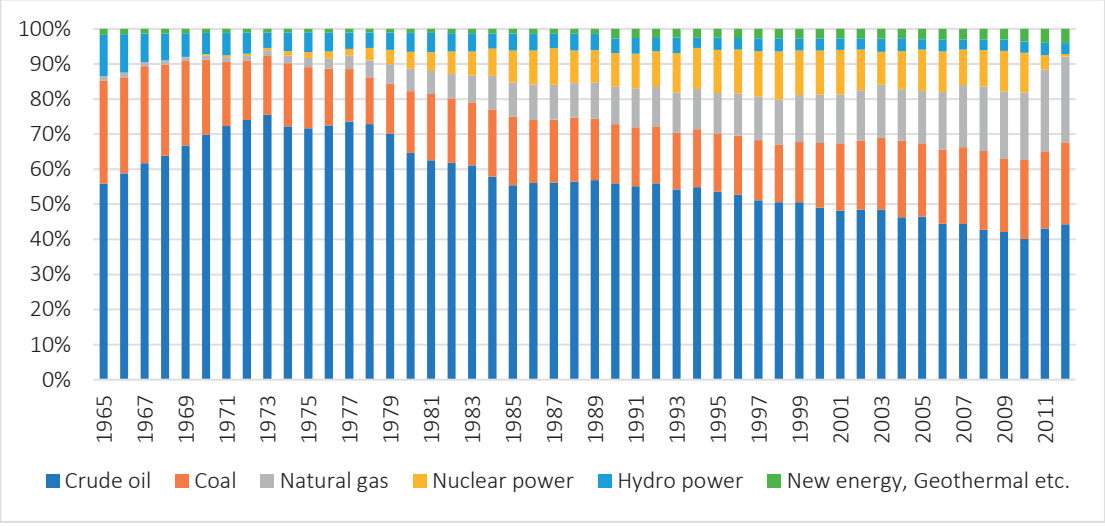

Figure 2: Composition shifts in Japan's domestic energy supply (Unit: %)
Source: Ministry of Economy, Trade and Industry (Ed.) (2014). *The Cabinet Approved the 2014 Annual Report on Energy (Japan's Energy White Paper 2014)*, Figure 211-3-1 (http://www.enecho.meti.go.jp/about/whitepaper/2014html/2-1-1.html). (Access Date: 2015/09/24)

As shown in Figure 2, since 2011, Japan's reliance on nuclear energy has decreased dramatically (owing to the government's decision to shut down almost all of the country's nuclear power plants in the wake of the Fukushima Dai'ichi incident. As of the summer of 2015, there was only one nuclear plant operating in Japan.

(3) Literature Review: Determinants of Japan's Energy Policies

What kind of factors affect political decisions regarding Japan's energy policy? In general, energy supply system has not changed dramatically. One reason may be because energy policy is known to have a higher path dependency among policy fields (Berkhout 2002; Kuper and van Soest, 2003; Okumura, 2007; OECD, 2012; Kikkawa, 2013) and is a critical component of the infrastructure development undertaken in the early stages of nation building. Actor roles, such as those played by interest groups, are firmly formed, making it unlikely that institutional change can be implemented. Okumura Norihiko suggests that new global energy strategies and modeling based on the path dependency and lock-in (Okumura, 2007) may provide some clues as to how energy policy shifts occur. The OECD's Green Growth Studies analysis reports that the energy sector posed a particular challenge in the context of green growth due to its size, complexity and path dependency (OECD, 2012: 5).

Regarding Japan's energy policy, the features of post-war policy organization in Japan include principles of a shared management system, preliminary policy reviews by the ruling political party (coalition leader), and a dual system of government administration involving the bureaucracy and the political party in power. Among those features, mutually autonomous organization of the ministries form the core of what Morita (2000, 103) refers to as the *shōchōkyōdōtai* (ministerial consortium) composed of the bureaucracy, elected politicians who are aligned with specific policy groups, and for-profit organizations. Able to circumvent the cabinet, this ministerial consortium has exerted a major influence on policy-making. Within this system, in particular, Morita (2000, 106) notes that "in the case where a new issue is discovered that lies outside existing issue areas, a 'turf war' develops which multiplies the adverse effects." Global environmental policy is precisely such an issue. The ministerial consortium charged with the objective of protecting the environment finds itself in the position wherein it must promote measures that conflict with its influential counterpart composed of industry groups, lawmakers, and business administrators. This leads to environmental policy becoming a policy area that is polarized between two ministerial consortia. As a result, a conflict structure composed of proponents and opponents with competing measures is formed (Kubo, 2012: 135).

Kubo Haruka investigated the influence of political restructuring and government reorganization since the 1990s on environmental policy in general with particular attention to measures concerning global warming. Identifying five factors, including relationships among main actors concerning policy formation, adjustment area and stages, the scope of the policy area, the relationship between the measures that involve the policy, and policy direction, Kubo examined the presence or absence of policy transformation and analyzed the content of such transformation. Kubo found that there was an observed transformation in the latter half of the 2000s. Along with expansions of the range of the Cabinet Secretariat's planning functions, there was also change in how inter-ministerial adjustments were conducted through an increase in joint committee meetings and joint administration projects. Furthermore, transformation was also propelled by the expanding political power of environmental NGOs (non-government organizations) and a change in consciousness within the Ministry of the Environment. The overall result was a relative reduction in inter-ministry conflict. As such, these identified elements led to what could be perceived as a change in policy output (Kubo, 2012).

In addition, using ozone depletion treaties as a case study, Kubo also explored how obligations imposed by international treaties were being fulfilled domestically and analyzed the national implementation framework and process. Kubo's results showed that through the activation of cross-border activities of companies and environmental NGOs, each organization's international network contributed to resolving issues. Furthermore, she identified coalesced policy areas occupied by the public and private sectors, as well as international and domestic policy areas.

There has also been research investigating Japan's energy policy from international perspectives. Watanabe Rie analyzed the political process of climate change and energy policies in Japan and Germany, and suggests that international progress on the climate change laws and international debate progress on climate change have been the major factors in determining Japan's climate and energy policies. She does not suggest that progress has been made in altering Japan's energy policy. The Liberal Democratic Party of Japan (LDP) has been dominant in Japan's political system from 1955 to 2009 and, as a result, political opportunities to make fundamental changes in energy policy have been relatively closed (Watanabe, 2011). In resource-challenged Japan, energy policy is an especially critical policy area for the Japanese government. Compared to other countries such as Germany where the policy

community is more dynamic, Japan's policy community is relatively stable, and it is improbable that institutional change can occur (Hartwig et al., 2015).

2. Framework and Methodology

(1) Framework

We assume that direct and indirect connections between industrial and environmental sectors enhance environmental policy-making processes. Gesine Foljanty-Jost suggests that the German policy-making network in 1990s was more tightly integrated than its Japanese counterpart (Foljanty-Jost 2005). She indicates that NGOs in Japan lacked personnel resources and are not located in influential positions in the network. In this paper, we use data from the "Global Environmental Policy Network Survey (GEPON2)."[2] In order to target our analysis, we focus on the integration of the feed-in tariff policy-making process.

The other perspective in our analysis is flexibility within the policy network. As noted above, the Japanese renewable energy policy-making network is considered to be relatively stable and stationary. In order to assess if acquiring flexibility might be associated with the enactment of the feed-in tariff law, we analyze different types of networks to investigate differences between policy communities and issue networks.

(2) Methodology

We calculated the centrality measures, drew the feed-in tariff policy-making networks, and set organization-level and sector-level units as vertices. The organization-level units are organizations regarded as major actors in global environmental policy. The edges represent daily communication or lobbying activities between them. The sector-level units are categories based on legal status and activity. We attach more weight to betweenness than degree centrality in order to clarify which actors contribute to integration.

We drew the networks according to the following manner. The sizes of the vertices is proportional to the square root of betweenness centrality. Each edge is weighted by the number of linking organizations when we deal with sector-level networks. And vertices are positioned by the Fruchterman-Reingold algorithm.

First, we identified the network that relates to "information" as the "information network" and similarly identified "human and material support" network as the "support network." These networks describe the daily exchanges related to climate change and energy policy in general and are best understood to be universal networks that do not focus on a particular policy. By comparing the two networks, we can measure their flexibility. If the two networks vary considerably, we expect that the FIT (feed-in-tariff) policy-making network will be similar to the issue network that can change in response to a particular policy (Heclo, 1978; Smith, 1991). In contrast, the results that do not vary significantly suggest that the FIT network maintains a fundamentally stable formation similar to the political community.

(3) Data sources[3]

As noted above, our data source is the GEPON2 Survey. Table 1 shows the proportions of the target population and response rates received between December 2012 and June 2013. The target population for the survey was determined as follows. Within the survey, "organizations that influence policies regarding global warming" were positioned as the target population for the survey. Thus, the survey was not conducted via random sampling, but rather, used multiple references to identify the organizations that were considered to be influential. After this identification process, these organizations were used as the target population for the survey. Table 2 shows the five main categorizations of organizations.

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[2] The "Global Environmental Policy Network Survey II" (GEPON2), directed by Professor Yutaka Tsujinaka of the University of Tsukuba, was conducted between December 2012 and June 2013. The respondent rate was 62.2% (target population of 172 organizations, responses gained from 107 organizations including political parties, the government, interest groups, and civil society organizations.

[3] For further details regarding the GEPON 2 Survey, refer to Kobashi & Tsujinaka (2014).

Table 1: GEPON2 Target population and response rates

Organization type	Target population (N)	Responses (N)	Response rate (%)
Governmental office	23	17	73.9
Independent administrative corporation/special corporation under civil law	9	8	88.9
Party-affiliated/multi-party Diet members	7	6	85.7
Economic/industrial organization	19	15	78.9
Public company/business corporation	41	21	51.2
Environmental NGO	19	12	63.2
Incorporated foundation	30	15	50.0
Mass media	13	6	46.2
Other private organization	11	7	63.6
Total	172	107	62.2 (avg.)

Table 2: Indicators used to verify survey targets

Category	Index
A. Actors, government agencies, or scholars participating in national and international policy formation (83 organizations)	Participants in both COP15[4] and COP17[5], participants in Ministry of the Environment (MOE) commission meetings as well as parliamentary hearings of related bills, representatives from the top five parties in terms of legislative seats of the House of Representatives.
B. Actors involved in implementing national policies for the reduction of industrial greenhouse gas emissions (26 organizations).	High-ranked greenhouse-gas-emission-producing organizations according to governmental documents, major domestic companies with business plans involving renewable energy according to news reports in the *Asahi* newspaper and the *Nihon Keizai* newspaper.
C. Actors, NGOs and mass media participating indirectly in policies aimed at reducing greenhouse gas emissions (29 organizations)	NGOs with resources and interest in global warming, mass media organizations.
D. Actors considered to be important as identified by global warming policy specialists in 1997 (87 organizations)	Organizations that responded to the first GEPON survey conducted in 1997.
E. Other (12 organizations)	Researchers‘ judgement.

[4] 15th Conference of the Parties (COP 15) to the United Nations Framework Convention on Climate Change (UNFCCC) held in 2009.
[5] 17th Conference of the Parties (COP 17) of the UNFCC.

We used the following questions for our analysis.

Policy community 1: Information network

Responses to the following two questions in the GEPON 2 Survey were used to map the information network.

Question 7: With regards to policy responses to climate change, who does your organization give information to? (Multiple answers)

Question 8: With regards to policy responses to climate change, from whom does your organization obtain information? (Multiple answers)

Policy community 2: Support network

Responses to the following two questions in the GEPON 2 Survey were used to map the support network.

Question 9: With regards to policy responses to climate change, to whom does your organization give personnel and physical support (not information)? (Multiple answers)

Question 10: With regards to policy responses to climate change, from whom does your organization obtain personnel and physical support (not information)? (Multiple answers)

Issue network

Question 35 in the GEPON 2 Survey asked respondent organizations to indicate with whom they work with regarding the FIT Law (multiple responses were allowed) from the organizations listed in Table 3.

Table 3: Actors involved in the FIT Law

Actor	Actor
A. Prime Minister's Office and/or Cabinet Secretariat	K. Electricity and/or gas industry
B. Democratic Party of Japan (DPJ)	L. Renewable energy industry
C. Liberal Democratic Party of Japan (LDP)	M. Transportation industry
D. Related factions within political parties and/or parliamentarian coalition	N. Trading companies
E. Ministry of the Environment and/or its related organizations	O. International NGOs (including their domestic branches within Japan)
F. Ministry of Economy, Trade, and Industry and/or its related organizations	P. Domestic environmental NGOs and/or NPOs, as well as citizens' groups
G. Japan Business Federation	Q. Mass media
H. Japan Association of Corporate Executives	R. International organizations
I. Japan Chamber of Commerce and Industry	S. Foreign governments
J. Manufacturing industry	T. Domestic public opinion

Attitude network

Responses to the following two questions in the GEPON 2 Survey were used to map attitudes toward the FIT Law.

Question 33: Within the 2011 FIT Law, promotion of the use of renewable energy resources by the government and increasing power rate were crucial issues. What was your organization's attitude towards these issues?

(a) Did you agree with the government's promotion of the use of renewable energy resources? (Response choices: Agree, somewhat agree, somewhat disagree, disagree, or not interested.)

(b) Did you acknowledge the increases in consumer power rates associated with the

promotion of the use of renewable energy resources? (Response choices: Could acknowledge, acknowledge to a certain extent, did not acknowledge to a certain extent, did not acknowledge, or not interested.)

Two different organizational categories were used for this analysis. We used the category of Question 35 to analyze the data with regards to Question 35, and used (a) the legal status and (b) the category based on the activities with regards to other questions.

3. Results[6]

As mentioned above, we describe policy community from information network and support network, and compare it with issue network with regards to Japan's FIT Law. In addition, we use the "group category" such as National NGO, global NGO, parties, METI and so on to analyze Figure 3, Figure 6 and Figure 9 while we analyze the institution itself to make Figure 4, Figure 5, Figure 7 and Figure 8.

(1) Information network

First, we drew the information network from the responses to Question 7 (identifying information recipient organization) and Question 8 (identifying information provision organization).

Figure 3 shows the information network that we drew from responses to these two questions. Situated in the center of Japan's information network are the Ministry of Economy, Trade, and Industry (METI), and national NGOs, while economic and industrial organizations (including trade organizations, economic organizations, energy organizations, and manufacturing organizations) and political parties stand at the periphery. Composed of other actors, such as MOE and media, their presence lies between the center and the periphery. We confirmed a strong tie between METI and the national NGOs from Figure 3 as well.

Figures 4 and 5 show the information networks that we drew from the questions above. The colors show the four classifications that were formed on the basis of attitudes towards Japan's FIT Law: Blue denotes agreement with FIT group, red denotes disagreement with FIT group, yellow denotes the ministries, and gray denotes "no answer".

Situated in the center of Japan's information network are the ministries and the group that agrees with the FIT Law, while those that disagree with the FIT Law are located at the periphery. In other words, we confirmed that there was fundamental agreement with regards to the FIT Law between the actors who are situated at the center of the information network such as ministries and the "agreement" groups.

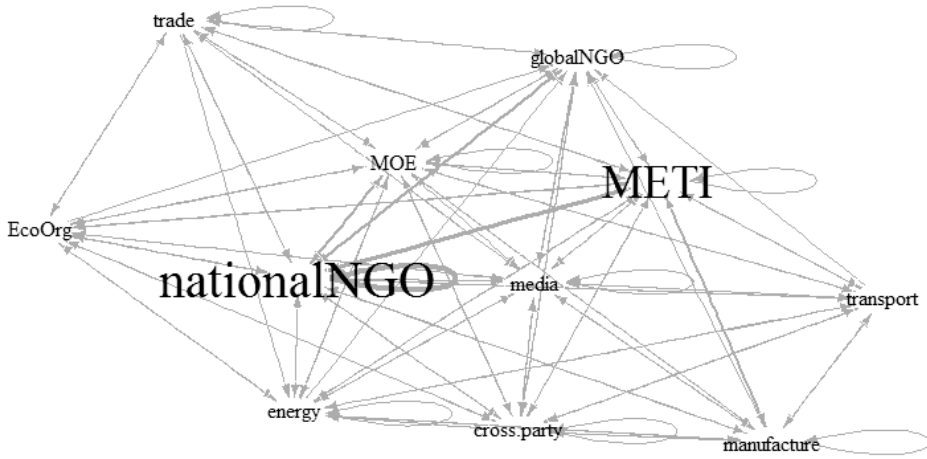

Figure 3: Information exchange (Q7 and 8)

[6] The basic statistics are shown in the Appendix.

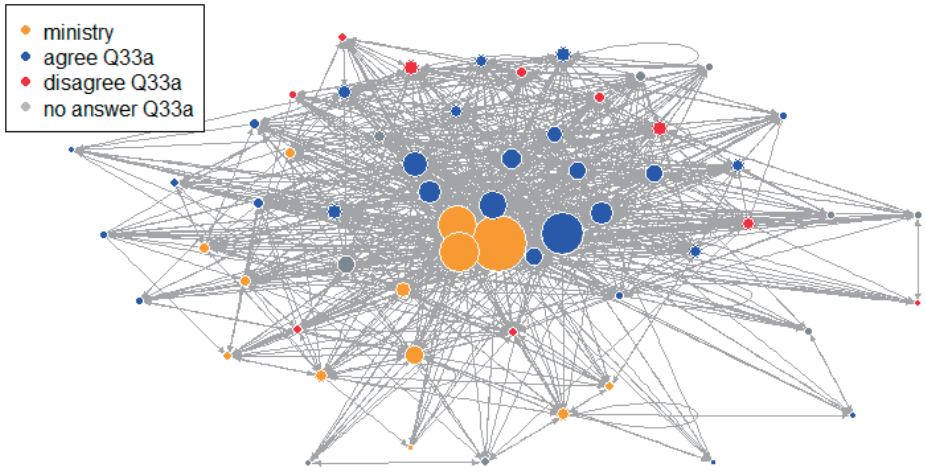

Figure. 4: Information and attitude network (Q7, 8, Q33a)

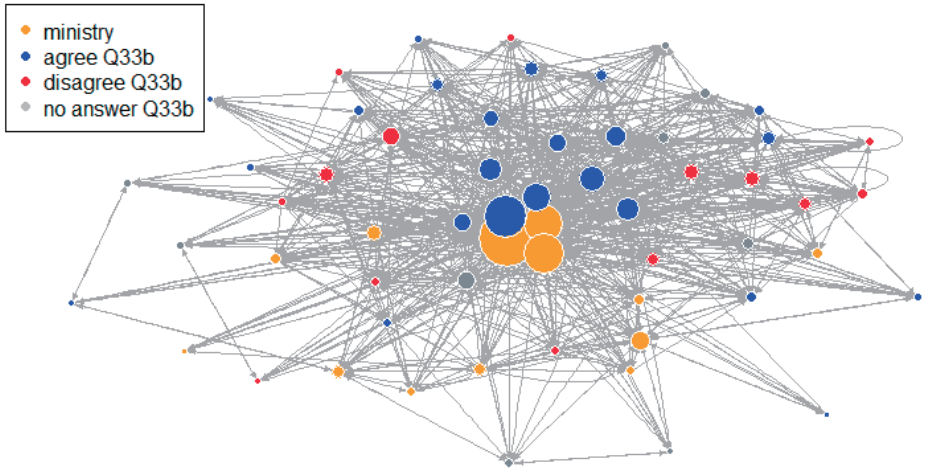

Figure 5: Information and attitude network (Q7, 8, Q33b)

(2) Support network[7]

Turning to the policy community support network, we drew the network from the following two questions:

Question 9: With regards to policy responses to climate change, to whom does your organization give personnel and physical support (not information)? (Multiple answers)

Question 10: With regards to policy responses to climate change, from whom does your organization obtain personnel and physical support (not information)? (Multiple answers)

Figure 6 shows the support network that we drew from the responses to these two questions. Situated in the center of Japan's support network are METI and national NGOs, and trade organizations are relatively centered as well. However, the economic and industrial organizations, such as economic organizations, energy organizations and manufacturing organization, political parties, and MOE stand at the periphery. We confirmed a strong tie between METI and the national NGOs from Figure 7 as well.

Figures 7 and 8 show the support network that we drew from the questions above. The "agreement" groups were positioned at the center of Japan's support network, while the "disagreement" groups and

[7] The data for the support network includes missing values, and we acknowledge that could provide bias to our result.

ministries lie at the periphery. However, the tie between the “agreement” groups and the “disagreement” groups exists, and they are not separated completely.

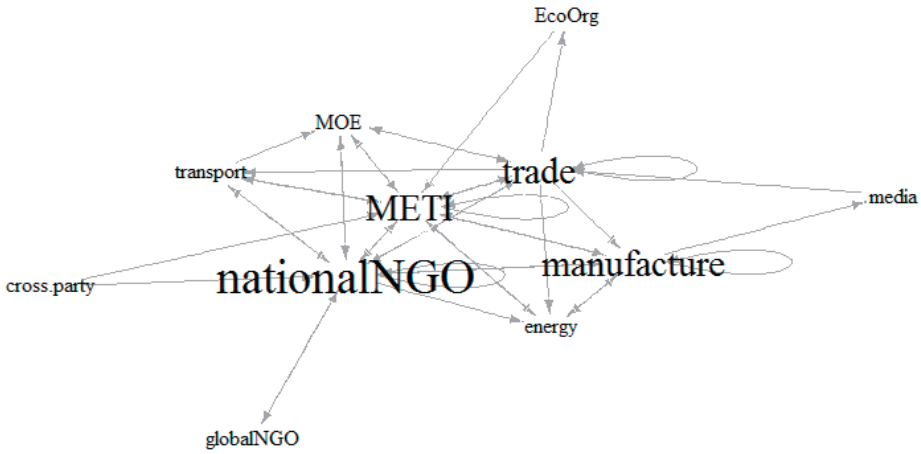

Figure 6: Support network (Q9, 10, Q35)

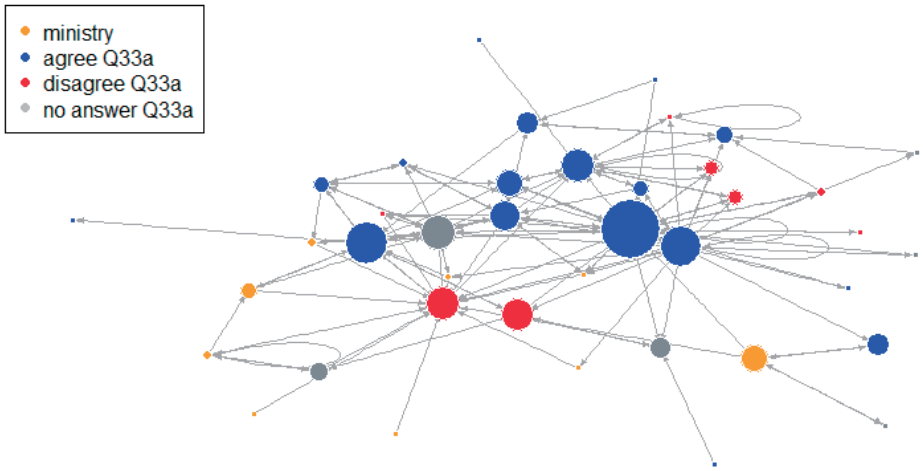

Figure 7: Support network (Q9, 10, Q33a)

Figure 8: Support network (Q9, 10, Q33b)

(3) FIT network

Turning to Japan's issue network with regards to FIT Law, we drew the network using the following question: Q35. With whom does your organization work regarding the FIT law? (Multiple answers)

Figure 9 represents the issue network that we drew from the question above. Situated in the center of Japan's issue network are METI and MOE, and the national NGOs and global NGOs lies near these ministries, while the economic and industrial organizations, such as manufacturing organizations, economic organizations, trade organizations, transport organizations and energy organizations, stands at the periphery.

Our network mapping in Figure 9 indicates that the issue network shows a tie between METI and national NGOs and global NGOs, and a tie between MOE and the economic organizations and manufacturing organizations. In other words, we were able to confirm a relatively firm tie between the economic and industrial groups and the environmental groups, and they are not separated completely.

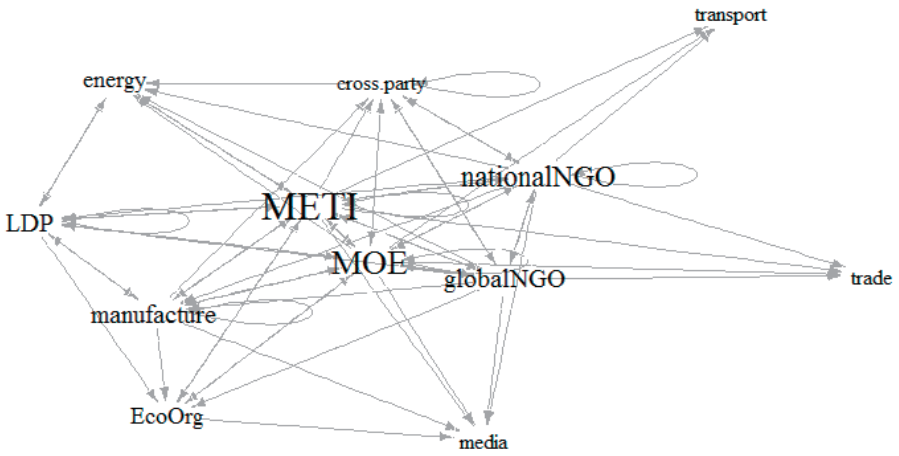

Figure 9: Issue network (Q35)

(4) Comparison

As noted earlier, by comparing the information networks, support networks, and the FIT policy-making network, we can measure their flexibility. If the two networks vary considerably, we expect that the FIT policy-making network will change in response to a particular policy (Heclo, 1978; Smith,

1991). In contrast, as there is not a significant variance, our results suggest that the FIT network maintains a fundamentally stable formation similar to the political community.

Based on the information network and support network, METI and the national NGOs are at the center of the network, while economic and industrial organizations are at the periphery. Moreover, the actors at the center of the network agree with the FIT law, while cautious actors are at the periphery. However, the two different groups are not separated completely and there are ties between METI and the national NGOs, as well as between MOE and the economic and industrial organizations.

On the other hand, based on the FIT network, METI and MOE are at the center of the network and the national NGOs and global NGOs are clustered around them. The economic and industrial organizations are farther away at the periphery. Here as well, there are the ties between METI and NGOs, as well as between MOE and the economic and industrial organizations.

By comparing two networks, we can confirm the FIT policy-making network is similar to the information network and support networks that describe the daily exchanges related to climate change and energy policy in general in terms of the following two points. First, the network structures are likely to be similar; METI and MOE are at the center of the network, and the national and global NGOs are around them, and the economic and industrial organizations are more at the periphery. Second, there are the ties between METI and the NGOs, as well as between MOE and the economic and industrial organizations, and they are not separated completely. These results allow us to suggest that the FIT network maintains a fundamentally stable formation similar to the political community.

These policy network structures could explain that the reason why the FIT Law was enacted. The FIT policy-making network is similar to the information network and support network, demonstrating firmness and stability. Moreover, the political actors at the center of the network are in agreement with the FIT Law. That suggests that political agreement between actors has been built gradually through primary political adjustments such as councils. As a whole, the FIT Law has been an enduring political issue during the short-lived DPJ administration (2009 to 2012) and the resurgence of the LDP government in the general election of December 2012. This connection to political processes and policy formation could explain how the FIT Law came to be enacted after March 2011.

Table 4: Comparison

	Information network	FIT network
The center	METI and national NGOs	METI and MOE
The middle	—	National & global NGOs
The periphery	Economic and industrial organizations	Economic and industrial organizations
Attitude toward the FIT	Actors in the center of the network agree with FIT	—
Other features	Ties between METI & NGOs, and between MOE & economic and industrial organizations	Ties between METI & NGOs, and between MOE & economic and industrial organizations

4. Conclusion and future directions

As mentioned above, energy policy fields are said to maintain a higher path dependency. However, despite of this fundamental policy feature, the FIT Law was enacted in 2011 in Japan. This study attempted to assess the factors associated with implementing the FIT Law as well as the roles of the relevant major actors. More concretely, through this comparison, we discovered that the FIT policy-making network is similar to the information and support networks that describe the daily exchanges related to climate change and energy policy. We were also able to measure flexibility. As a result, we can confirm the fact that the network structures are likely to be similar and that there are the ties between METI and the NGOs, as well as between the MOE and the economic and industrial organizations. That the results do not vary significantly suggests that the FIT network maintains a fundamentally stable formation similar to the political community.

These results could explain that the reason why the FIT Law was enacted. The FIT policy-making network maintains similar features—firmness and stability—to those of political communities.

Moreover, the political actors at the center of the network are in agreement with the FIT Law. This result suggests that political agreement between actors has gradually been built through primary political adjustments such as the councils. In the past five years, the FIT Law has been a political issue from its inception to its enactment after March 2011.

The strength of our research lays in our focus on political networks and their contributing mechanism to the law's implementation through analysis of the political process. From an academic perspective, identifying the key actors and factors may be significant in explaining institutional change in policy areas with high path dependency.

In the future, we will continue this line of inquiry with regards to other policy initiatives involving the energy sector, including the deregulation of electricity companies (which is set to come into force within the next three years in Japan). By assessing the policy networks for individual issues and comparing them over time, we believe that we can reveal new dimensions in political relationships and policy formation. While this research has focused on close examination of the FIT Law, the wider implications suggest a framework for assessing how societies can promote renewable and sustainable energy resources.

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Appendix

Appendix Table 1: Network Characteristics

	Information network	Support network	Information (group)	Support (group)	Q35 (group)
Density	0.324	0.090	0.780	0.311	0.515
Transitivity	0.567	0.266	0.920	0.574	0.726
Reciprocity	0.724	0.529	0.936	0.703	0.581
N	59	40	12	12	12

Appendix Table 2: Means of Centrality Measures (Information Network)

Category	In-degree	Betweenness	PageRank	N
Ministry	20.385	94.353	0.017	13
Govt. related	22.333	76.472	0.018	6
Party	35.500	59.595	0.034	2
Cross-party	14.000	9.553	0.014	1
Company	11.857	3.070	0.010	7
Economic	16.000	18.239	0.016	2
Industrial	15.000	8.300	0.013	10
Media	37.000	73.218	0.034	2
NGO	23.286	15.896	0.022	7
Foundation	13.833	15.366	0.014	6
Other	13.667	6.654	0.015	3
Total	18.814	39.407	0.017	59

Appendix Table 3: Means of Centrality Measures (Support Network)

Category	In-degree	Betweenness	PageRank	N
Ministry	1.556	15.162	0.010	9
Govt. related	9.250	251.651	0.051	4
Party	0.000	0.000	0.004	1
Company	6.000	125.896	0.030	5
Economic	1.000	0.000	0.004	2
Industrial	2.286	33.452	0.023	7
Media	2.000	38.000	0.013	1
NGO	4.750	67.721	0.052	4
Foundation	3.000	79.093	0.024	5
Other	3.000	18.475	0.021	2
Total	3.525	68.700	0.025	40

Table Appendix-4: Centrality Measures (Group Level Information Network)

Category	In-degree	Betweenness	PageRank
LDP	0	0.000	0.013
Cross-party	10	0.000	0.117
MOE	10	0.000	0.109
METI	11	35.500	0.077
Economic Org.	7	0.000	0.113
Manufacturer	8	0.000	0.046
Energy	10	0.000	0.098
Transport	7	0.000	0.094
Trade	7	0.000	0.080
Global NGO	11	0.000	0.113
National NGO	11	51.500	0.048
Media	11	0.000	0.090

Appendix Table 5: Centrality Measures (Group Level Support Network)

Category	In-degree	Betweenness	PageRank
Cross-party	0	0.000	0.014
MOE	4	0.000	0.110
METI	9	14.500	0.250
Economic Org.	1	0.000	0.032
Manufacturer	5	17.000	0.116
Energy	4	0.000	0.100
Transport	3	0.000	0.095
Trade	5	16.000	0.130
Global NGO	1	0.000	0.020
National NGO	8	44.500	0.092
Media	1	0.000	0.041

Appendix Table 6: Centrality Measures (Q35)

Category	In-degree	Betweenness	PageRank
LDP	7	1.500	0.119
Cross-party	6	0.000	0.070
MOE	8	10.167	0.108
METI	8	18.750	0.134
Economic Org.	5	0.250	0.082
Manufacturer	6	1.250	0.082
Energy	6	0.250	0.086
Transport	3	0.000	0.052
Trade	4	0.000	0.057
Global NGO	4	1.417	0.058
National NGO	5	3.417	0.063
Media	6	0.000	0.088

エネルギーミックスと経済の強靭性

－国際比較を通した分析－

Energy Mix and Economic Resilience:
An International Comparison

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本章は、日本のエネルギー政策の基本的な方針であるベストミックスを経済の強靭性という観点から評価する。日本はオイルショック以降、発電方式の多様化を重視し、原子力、火力、水力などの電源をバランスよく供給することで「電源のベストミックス」を目指してきた[1]。

資源エネルギー庁では定期的にエネルギーミックス（長期エネルギー需給の見通し）が発表され、全エネルギーに占める原子力、火力、（水力を含む）再生可能エネルギーの目標比率が示される。エネルギーミックスを一種のポートフォリオと捉えると、化石燃料をはじめとしたエネルギー価格の変動に対してリスク分散の効果があることが期待される。しかし、リスク分散と危機に対する強靭性（レジリエンス）は区別して考える必要があり、従来のアプローチでは、リーマンショックや東日本大震災のような突発的かつ広範囲に影響を及ぼす危機への対応として十分ではないことが指摘されている（Aiginger 2009；藤井・久米・小林 2014）。エネルギーミックスはエネルギー基本計画の基軸に据えられており、強靭性も含め多角的な観点からも評価することに意義があると考える。そこで、OECD 26 か国のデータを用いた分析によりエネルギーミックスと経済強靭性との関係を検証する。

1. 研究の背景と目的

日本政府が 2014 年に発表したエネルギー基本計画[2]では、東日本大震災以降、原子力発電所を停止したことで化石燃料への依存が高まり、その影響がマクロ経済にまで及んでいることを問題視している。その上で、民主党政権下で一度、見直しが検討された長期エネルギー需給について、各エネルギー源の特性を踏まえてバランスよく配備することの重要性を唱えている。そして、翌年に発表された長期エネルギー需給見通し[3]では経済と環境の双方に配

[1] 電気事業連合会 http://www.fepc.or.jp/enterprise/supply/bestmix/（2018 年 1 月 14 日閲覧）.
[2] 経済産業省. (2014). エネルギー基本計画.
http://www.enecho.meti.go.jp/category/others/basic_plan/pdf/140411.pdf （2018 年 1 月 21 日閲覧）.
[3]経済産業省. (2015). 長期エネルギー需給見通し.

慮した経済需給構造を目指し、2030 年度の一次エネルギー供給比率を再生可能エネルギー13～14%、原子力 10～11%、天然ガス 18%、石炭 25%、LPG3%、石油 30%程度と見積もっている。

このようなエネルギーミックスを前提としたエネルギー政策は、化石燃料価格の高騰に対する経済の安定、エネルギー自給率の改善といった想定される課題に対して一定の効果があると期待される一方で、オイルショックのような突発的かつ影響が広範な危機に対して十分なアプローチかといえば疑問が残る。Aiginger（2009）はサブプライム危機のようなショックは従来の経済安定を図る施策では対応できず、このような危機に対する強靭性（resilience）を定める新たな要因を明らかにする必要性を指摘する。また、藤井・久米・小林（2014）では近年、レジリエンスの概念が世界的に注目を集めていることを指摘し、致命傷を受けない、被害を最小化する、すぐに回復するという 3 つの要因からなると述べている。藤井らは東日本大震災やテロを念頭に、老朽化したインフラの整備やテロ対策など危機に対する直接的な対策の必要性を唱えているが、このような例に限らず、不測の事態に対する強靭性を様々な角度から評価、改善することが大事だと考えられる。

以上を踏まえ、本章ではエネルギーミックスがもたらす経済的な強靭性の評価を目的とする。エネルギーミックスと GDP の変動の関係について OECD 26 か国の国家間比較、考察を行う。

2. エネルギーミックスの狙いと強靭性

2.1. エネルギーミックスを基本方針に据える狙い

前述の長期エネルギー需給見通しによると、エネルギー政策の要諦は安全性（Safety）、エネルギーの安定供給（Energy Security）、経済効率性の向上（Economic Efficiency）の 3 つであり、エネルギーミックスはこの 3 つに環境への適合（Environment）も加えて考慮した総合的な判断として策定されている。具体的な指標としては、原発依存度、エネルギー自給率（中東依存度）、電力コスト（国民負担）、CO2 排出量が挙げられている。以上の複数の目標を両立する上で、各電源の個性をバランスよく生かすのがベストミックスの趣旨となる。例えば、再生可能エネルギーはエネルギー自給率向上、CO2 排出抑制に貢献する一方で、太陽光や風力発電は不安定な出力への投資も含めて電力コストが高いと見られている（小宮山・藤井 2015）。指標が複数あるという点で違いはあるものの、異なる特徴を持つ各電源を組み合わせることで目標となる指標の分散を抑えつつ、期待値の最大化を図るという点では金融工学におけるポートフォリオと共通する。政府は上記の指標全てに対して、分散を抑えつつ一定以上の期待値になるよう電源の配分を決めるという最適化問題に取り組んでいるといえる。

実際にベストミックスを算出する方法としては、マクロ経済モデルに基づくシミュレーションがある。例えば藤井（2015）では、将来の電力需給について一定の前提を置きながら、電力需給モデルを線形計画問題として解析するという手法を取っており、その結果をもとにどの電源構成（エネルギーミックス）が最も適切かを評価している。

2.2. エネルギーミックスで想定されていない強靭性

上記の強靭性の定義に照らすと安全性や安定供給といった指標は強靭性に対応する指標と見なすことができる。電源コストだけを最適化する場合と比べると強靭性に配慮した計画だと言える。加えて、ポートフォリオを組むことにより各指標の分散を抑えることができれば、社会、経済に回復が困難となるほどの大きな負の影響が及ぶ確率を下げることにつながり、その観点からも強靭性の改善につながる可能性がある。

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http://www.enecho.meti.go.jp/committee/council/basic_policy_subcommittee/mitoshi/pdf/report_01.pdf（2018 年 1 月 21 日閲覧）

その一方で、エネルギー基本計画や長期エネルギー需給見通しに記載されている内容に従うと、オイルショックや自然災害、テロといった突発的かつ広範囲に及ぶタイプの危機に対する強靭性が十分に考慮されていない。原子力発電所の信頼と安全性を高めるという課題は挙げられているものの、エネルギーミックスが想定すべきオイルショックのような危機に対してベストミックスを組むという従来の方針以外のものが示されているわけではない。震災やオイルショックの影響は原発の停止、石油価格の高騰といったエネルギー市場に直接及ぶ影響だけでなく、被災によってダメージを被った企業とその取引先、被災地の社会、経済的なダメージ、オイルショックの背景にある戦争などの影響を受ける市場の停滞などの事象が間接的にエネルギー市場に影響を及ぼしうる。

Christopher（2004）による強靭なサプライチェーン（Resilient Supply Chain）の考察に基づくと、サプライチェーンを通して波及するタイプのリスクに耐えうるかどうかが強靭性の鍵であり、従来の政策では対応できない問題だとされる。オイルショックを例にとると、エネルギーミックスの議論で取り上げているのは石油価格の高騰が各企業に及ぼす負の影響までであり、企業へのダメージとその波及がサプライチェーン上で同時多発的に発生することの影響までは扱っていないことになる。

以上の問題はエネルギー基本計画の枠内だけで対処するものではないが、エネルギー政策に絞って考えた場合でも、エネルギーミックスをエネルギー政策の前提とすることが強靭性の観点で望ましいことなのかは議論の余地がある。仮に技術革新によって生まれた新たな電源が強靭性という観点から極めて優れている場合、バランスを度外視してその電源を重点的に配備する方が望ましい場合も考えられるだろう。この場合、エネルギーミックスという前提があることでエネルギー政策の柔軟性が失われてしまうという見方ができる。

ただし、エネルギーミックスが石油価格の高騰が及ぼす影響を緩和することでサプライチェーンに波及する前の段階で一定の抑止力となり、結果的に強靭性の改善に寄与している可能性がある。エネルギーミックスそのものが強靭性に寄与するかどうかという論点は、エネルギーミックスの正当性を論ずる上で重要であり、強靭性を改善する別の指標が見いだされた場合、エネルギーミックスを基本的な方針に据えること自体の是非を改めて問い直す必要があるだろう。

3. 分析

3.1. 仮説

以上を踏まえ、本章では以下の 2 つの仮説を検証する。簡単化のため本分析では経済の強靭性に対象を限定する。

仮説 1: エネルギーミックスにより火力発電の割合を低くすると、通常時の GDP の変動を抑える効果がある一方、戦争や世界的な不況といった危機に対する強靭性には必ずしも影響しない。

仮説 2: 再生可能エネルギー、原子力の割合の割合を高めると、通常時の GDP の変動を抑える効果がある（仮説 1 と対）。戦争や世界的な不況といった危機に対する強靭性は、リスクのより少ない再生可能エネルギーの方が高い。

仮説 1 に関しては、2.2 で言及したように、石油価格の高騰のような直接的な影響を考慮して設計されたエネルギーミックスでは危機に対する強靭性という点で不十分ではないかというものである。また、仮説 2 については石油価格といった市場に直接及ぼす影響とは異なる観点からの評価となる。

以上の仮説を検証するため、GDP の変動を被説明変数とする OLS 推定を行った。

3.2. データ

分析の対象は、チェコ、ハンガリー、ポーランド、スロヴァキア、バルト 3 国、ニュージーランド、スイスを除く OECD 26 か国の、1971 年から 2014 年までの 44 年間のデータである。

石油価格の変動は、英 BP 社の Statistical Review of World Energy 2017[4]のデータをもとに、Crude oil prices（2016 年時点での米国ドルベース換算値）の前年からの変動値を使用する。なお、各国が直面する石油価格は同一であると仮定する。

各国の GDP の変動およびエネルギー源別発電電力量割合は、世界銀行の World Bank Open Data[5]から得たデータを用いる（表 1 参照）。GDP の変動は、2010 年米国ドルベースでの実質値を、2010 年＝100 となるよう指数化した上で、前年からの変動値を使用する。発電電力量割合におけるエネルギー源には、再生可能エネルギー（水力を除く）、原子力、火力（石油、天然ガス、石炭の合計）の 3 つを使用する。表 2 に各変数の基本統計量を示す。

戦争や世界的な不況といった危機にあたる年ダミーには、1974 年（第一次オイルショック）、1979 年（第二次オイルショック）、1990 年（湾岸戦争）、2002 年（同時多発テロからイラク戦争開始まで）、2008 年（リーマンショック）の 5 時点を用意した。

表 1　26 か国の実質 GDP(2010 年＝100)と電源別発電電力量割合（%）、1971 年と 2014 年

国名	1971 年					2014 年				
	GDP	発電電力量割合(%)				GDP	発電電力量割合(%)			
		再生エネ	水力	原子力	火力		再生エネ	水力	原子力	火力
オーストラリア	29.6	0.5	21.8	0.0	77.7	111.7	7.5	7.4	0.0	85.1
オーストリア	39.3	0.8	57.5	0.0	41.7	104.4	14.6	66.6	0.0	17.7
ベルギー	41.7	0.0	0.4	0.0	99.6	103.6	16.6	0.4	47.2	33.5
カナダ	33.9	0.0	73.2	1.9	24.8	110.3	4.5	58.3	16.4	20.4
チリ	22.3	0.8	56.4	0.0	42.8	118.5	9.8	31.3	0.0	58.4
ドイツ	46.3	0.8	4.1	1.9	93.1	106.7	23.0	3.1	15.6	56.7
デンマーク	48.2	0.0	0.1	0.0	99.9	104.2	55.8	0.0	0.0	41.9
スペイン	33.5	0.1	51.7	4.1	44.2	95.8	25.9	14.2	20.8	38.8
フィンランド	35.0	0.0	49.0	0.0	51.0	99.7	18.9	19.7	34.6	25.8
フランス	41.6	0.5	31.3	6.0	62.2	103.8	5.1	11.3	78.4	4.8
イギリス	42.3	0.0	1.3	10.8	87.9	108.3	17.7	1.8	19.0	60.8
ギリシャ	42.4	0.0	22.9	0.0	77.1	82.1	15.3	8.9	0.0	75.6
アイルランド	17.1	0.0	7.4	0.0	92.6	113.4	21.8	2.7	0.0	75.2
アイスランド	28.0	0.8	96.2	0.0	3.0	109.9	28.9	71.0	0.0	0.0
イスラエル	19.4	0.0	0.0	0.0	100.0	114.9	1.5	0.0	0.0	98.5
イタリア	45.5	3.4	31.5	2.7	62.4	96.2	22.3	21.1	0.0	55.5
日本	35.3	0.0	22.0	2.1	75.9	103.8	6.1	7.9	0.0	85.6
韓国	5.9	0.0	12.5	0.0	87.5	112.8	1.1	0.5	28.7	69.5
ルクセンブルク	23.2	0.0	4.1	0.0	95.9	112.0	15.3	5.7	0.0	76.2
メキシコ	26.8	0.0	46.3	0.0	53.7	112.2	4.6	12.9	3.2	79.2
オランダ	39.6	0.0	0.0	0.9	99.1	101.8	11.2	0.1	4.0	83.0
ノルウェー	30.8	0.0	99.6	0.0	0.4	106.9	1.7	96.0	0.0	2.0
ポルトガル	34.1	1.8	78.1	0.0	20.0	94.0	30.8	30.0	0.0	38.8
スウェーデン	44.0	0.2	78.2	0.1	21.5	106.3	14.3	41.5	42.3	1.1
トルコ	20.1	1.7	26.7	0.0	71.7	132.8	4.8	16.1	0.0	79.0
アメリカ合衆国	33.0	0.0	15.5	2.4	82.1	108.1	6.9	6.1	19.2	67.5

[4] https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of- world-energy.html
[5] https://data.worldbank.org/

表 2　基本統計量

	平均	標準偏差	中央値
GDP の変動(2010 年＝100 とした指数値)	2.027	15.50	1.044
石油価格の変動(2016 年米国ドルベース)	1.707	1.935	1.761
再生可能エネルギーの発電電力量割合(%)	3.370	5.946	1.249
原子力の発電電力量割合(%)	12.05	18.48	0
火力の発電電力量割合(%)	58.52	30.86	58.52

3.3. 結果と考察

分析結果を表 3、4 に示す。表 3 の通り、石油価格の変動は GDP の変動に正に有意な影響があるという結果になった。このことは、石油価格の変動が経済の強靭性を脅かすリスク要因となっていることを意味する。

火力の発電電力量割合は、GDP の変動に有意な影響を与えておらず、仮説 1 で想定していた効果は確認できなかった。また、火力の発電電力量割合と、石油価格の変動、戦争や世界的な不況といった危機の起こった年ダミーとの交互作用項を入れて再度分析したところ、表 4 の通り、いずれの交互作用項も有意にならなかった。このように、火力発電の割合が高いからといって、危機に対する強靭性への影響は必ずしも確認できないという結果となった。

一方で、再生可能エネルギーの発電電力量割合が高いほど、GDP の変動が有意に小さくなる効果が確認できた。反対に、原子力の発電電力量割合は、GDP の変動に有意な影響を与えておらず、仮説 2 の想定していた効果は確認できなかった。また、表 4 にある通り、再生可能エネルギー、原子力の発電電力量割合と、石油価格の変動、危機の起こった年ダミーとの交互作用項はいずれも有意にならなかったことから、再生可能エネルギー、原子力、いずれも危機に対する強靭性への影響は必ずしも確認できないという、仮説 2 とは異なる結果となった。

以上、分析結果からはエネルギーミックスには、石油価格の高騰を通して引き起こされる変動に対しては一定の相関がみられ、エネルギー基本計画や長期エネルギー需給見通しで期待される効果と整合的だが、一方で石油価格では説明できない変動に対しては再生可能エネルギーを除き有意な相関を示さなかった。エネルギーミックスはあくまで計画で考慮される危機の影響に対してのみ影響を及ぼすものと考えられる。ただし、年ダミーが想定と異なる相関を示していることから危機による負の影響を適切に捉えることができておらず、この点を改善する必要がある。

表 3　GDP の変動を被説明変数とする OLS 推定

		係数	標準誤差
切片		2.038	0.149 ***
石油価格の変動		0.069	0.005 ***
再生可能エネルギー		-0.038	0.009 ***
原子力		-0.004	0.003
火力		-0.001	0.002
年ダミー	その他	（基準）	—
	1974 年	-3.711	0.395 ***
	1979 年	-3.782	0.428 ***
	1990 年	-0.490	0.351
	2002 年	-0.090	0.348
	2008 年	-2.795	0.368 ***
R2		0.186	
修正 R2		0.179	
F 値		28.76	***

***: p<0.01, **: p<0.05, *: p<0.1

表 4　GDP の変動を被説明変数とする OLS 推定（交互作用項の追加）

		モデル 1		モデル 2		モデル 3	
		係数	標準誤差	係数	標準誤差	係数	標準誤差
切片		2.026	0.149 ***	2.038	0.149 ***	2.028	0.155 ***
石油価格の変動		0.065	0.006 ***	0.069	0.006 ***	0.073	0.010 ***
再生可能エネルギー		-0.037	0.009 ***	-0.038	0.009 ***	-0.038	0.009 ***
原子力		-0.004	0.003	-0.004	0.003	-0.003	0.003
火力		-0.001	0.002	-0.001	0.002	-0.001	0.002
年ダミー	その他	（基準）	―	（基準）	―	（基準）	―
	1974 年	-3.842	0.473 ***	-3.665	0.477 ***	-3.180	0.898 ***
	1979 年	-3.818	0.565 ***	-3.823	0.543 ***	-3.762	0.959 ***
	1990 年	-0.203	0.446	-0.523	0.437	-1.085	0.733
	2002 年	0.215	0.446	-0.079	0.432	-0.486	0.759
	2008 年	-2.773	0.521 ***	-2.770	0.450 ***	-2.508	0.795 ***
交互作用	再生エネ×石油価格	0.001	0.001				
	再生エネ×1974 年	0.657	0.510				
	再生エネ×1979 年	0.380	0.522				
	再生エネ×1990 年	-0.141	0.150				
	再生エネ×2002 年	-0.082	0.076				
	再生エネ×2008 年	-0.005	0.052				
交互作用	原子力×石油価格			0.000	0.000		
	原子力×1974 年			-0.023	0.101		
	原子力×1979 年			0.006	0.049		
	原子力×1990 年			0.002	0.016		
	原子力×2002 年			-0.001	0.017		
	原子力×2008 年			-0.002	0.019		
交互作用	火力×石油価格					0.000	0.000
	火力×1974 年					-0.008	0.013
	火力×1979 年					0.000	0.014
	火力×1990 年					0.010	0.011
	火力×2002 年					0.007	0.011
	火力×2008 年					-0.005	0.012
R2		0.190		0.186		0.188	
修正 R2		0.179		0.175		0.177	
F 値		17.62	***	17.17	***	17.39	***

***: p<0.01, **: p<0.05, *: p<0.1

4　結論と今後の課題

4.1. 結論

本章ではエネルギーミックスが経済強靭性に及ぼす影響について OECD 26 か国のデータを用いて検証した。エネルギーミックスはリスク分散という観点からは一定の効果が期待できるが、エネルギー基本計画の基本方針であるにもかかわらず、強靭性という観点からの評価は十分に行われていない。仮にエネルギーミックスという制約によって強靭性の改善が阻害されているのであれば、エネルギーミックスを政策の基本方針に据えること自体を見直すことも検討する必要があるだろう。その端緒として本章では石油価格の変動で統制した上でエネルギーミックスと経済の変動との相関を OLS 推定によって分析した。

分析結果を見ると、再生可能エネルギーのみが GDP の変動と負の相関を示し、化石燃料や原子力への依存度低下で強靭性が増すという結果は得られなかった。従来の政策では危機に対する強靭性という観点で十分ではないという Christopher（2004）の主張に沿った結果となった。

4.2. 今後の課題

まず、前述の年ダミーの係数が負または有意ではないことから、危機を表すダミー変数について改善が求められる。今回は OECD の各国に幅広く影響を及ぼす危機として戦争と世界的な不況を筆者の判断で選択したが、東日本大震災のような地域が限定される危機も分析対象に加えるためには、それぞれの国に焦点を合わせ、客観的な指標に基づき危機を選択できれば望ましい。また、危機が生じてから経済に影響が及ぶまでの期間についても危機に応じて異なると考えられるため、個別に分析を行い特定することが求められる。

また、今回は相関の分析にとどまっており、今回はデータ上の制約が厳しく断念したが、因果関係の分析に発展させるために時系列分析の導入を検討する。

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(Presentation)

Innovation or Tradition? Analyzing the Twitter Networks of Japanese Environmental Organizations

Leslie TKACH-KAWASAKI
Yutaka TSUJINAKA

Presentation
15th European Association of Japanese Studies Conference
Lisbon, Portual
August 30 to September 2, 2017

Innovation or Tradition? Analyzing the Twitter Networks of Japanese Environmental Organizations

Leslie Tkach-Kawasaki and Yutaka Tsujinaka
University of Tsukuba

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Funding Acknowledgement: The Comparative Energy Policy Discourse Project (CEDP) in Japan and Germany is funded by the Japan Society for the Promotion of Sciences (JSPS) (AAD26048) (Principal Investigator: Leslie Tkach-Kawasaki, University of Tsukuba).

Outline

1. Introduction & research question
2. Theory: Social media use by non-profit organizations
3. GEPON 2 Japan (2012-13) and the CEDP (Comparative Energy Discourse Policy) Project
4. Twitter use in Japan
5. GEPON 2 Japan (2012-13) organizations and online presence
6. GEPON 2 Japan organizations online
7. Method
8. Results
9. Discussion and Conclusion

2

Introduction

- Attracted by low cost, rapid dissemination, and the capability of forming and maintaining continuous information- and communications-oriented relationships, political actors—including non-profit organizations—have become frequent users of social media.
- How are Japanese environmental organizations are currently utilizing Twitter for information provision, engagement, and promotion?

3

Theory

Advantages:

- Rapid dissemination of general and event-related information
- Low cost

Disadvantages:

- Communication with limited publics (those that use microblogging services)
- Limitations in amount of information provision (mitigated by hyperlinks)

- Social-media use by non-profit organizations and microblogging functions include information provision, community-, and action-oriented functions (Lovejoy and Saxton, 2012).
- Non-profits are not taking advantage of leveraging potential (Greenberg & McCaulay, 2009).

4

CEDP (Comparative Energy Discourse Policy) Project (2014-2017)

Regional research: 領域開拓プログラム（公募型研究テーマ）
◆課題（研究領域）：「情報メディア発展のもとでの新しい地域研究」
◆研究テーマ：「エネルギー政策・言説の日独地域比較」

研究期間：H26.10～H29.9
委託費総額：11,163千円

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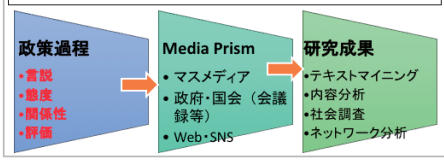
＜専門分野＞
政治コミュニケーション、ニューメディア、Webサイト内容分析
＜Webページ＞
http://japan.tsukuba.ac.jp/people/faculty/000197.html

＜研究目的・概要＞

・原発を含むエネルギー政策で日独に相違が生じる背景を明らかにする必要性。

エネルギー政策の「普遍性」と
日独の「地域性」を包括的に評価



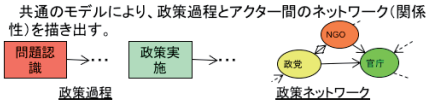
＜研究計画の特徴＞

理工系、人文系、社会科学系の各分野から
3つのアプローチで分析を行い、得られた知見を因果推論モデルとして統合。

⇒政策過程の評価

＜目標とする研究成果＞

（1）日独の政策過程の違いを解明する。
共通のモデルにより、政策過程とアクター間のネットワーク（関係性）を描き出す。



（2）日独のエネルギー政策を取り巻く言説を記述する。
国際的な影響の共通性を踏まえた上で、エネルギーに対する理解や価値観の相違を測る。

5

Background and aims of the CEDP

1. What is the nature of energy policy?
   - Political level: international (cross-border), national, local
   - Actor level: Legislative (government), corporate, civil society
   - Media level: Traditional mass media, Web 1.0 (websites and hyperlinks), social media
2. How is energy policy discussed in different media formats?
   - Comparisons between offline & online media format
   - Comparisons of relationships as identified through different methods
3. How can policy relationships in different countries be characterized?

   Through cross-national comparisons such as Germany and Japan

Focused attention on renewable energy policy throughout the world since the Fukushima Dai'ichi nuclear plant accident on March 11, 2011.

6

Methodology for realizing CEDP objectives

- Use the GEPON surveys for cross-national comparison between Germany and Japan
- Add Internet-based media components (websites, hyperlinks, social media)
- Applying modern methodological tools:
  - Hyperlink analysis (Internet & GEPON data)
  - Network analysis (Internet & GEPON data)
  - **Textual & sentiment analysis (Internet data)**

7

GEPON 2 Japan Survey (2012-13) (Professor Yutaka Tsujinaka, University of Tsukuba

Organizations
Survey of 107 organizations, including….
Government ministries & agencies (政府官庁) (includes subdepartments)
Independent advisory & specialty organizations (独立行政法人・特例民法法人)
Political parties & related groups (政党・超党派の議員連盟)
Economic and industry-specific organizations (経済・業種別団体)
Corporations (株式会社)
Environmental NGOs (環境NGO)
Foundations (財団法人)
Mass Media (マスメディア)
Other (including private organizations) (その他、任意団体)***

8

Background: Social media use in Japan

図表3-2-2-3 ソーシャルメディアの利用状況

(単位：%)

	Facebook	Google+	Twitter	LinkedIn	YouTube	Instagram	Pinterest
[日本]							
全体加重平均	35.3	9.4	28.7	2.1	39.5	10.2	1.5
20代(N=200)	51.0	15.0	53.5	4.0	61.5	24.5	4.5
30代(N=200)	42.0	11.0	35.5	4.0	50.5	16.0	2.5
40代(N=200)	34.0	10.0	29.0	0.5	41.0	8.0	0.5
50代(N=200)	27.5	7.0	21.0	1.0	26.5	4.5	1.0
60代(N=200)	26.0	5.5	11.0	1.5	23.5	2.0	0.0
[米国]							
全体加重平均	77.7	29.1	39.1	26.3	53.7	34.3	24.4
20代(N=200)	91.0	43.5	62.5	28.5	80.5	68.5	36.5
30代(N=200)	85.5	51.0	60.5	30.0	73.0	59.5	29.0
40代(N=200)	77.5	23.0	31.5	26.5	52.5	23.0	23.5
50代(N=200)	70.0	16.5	22.0	27.5	34.5	9.5	16.5
60代(N=200)	61.5	8.0	14.5	17.5	22.0	5.5	14.5

(Source: 平成28年版 情報通信白書, p. 170)

9

Organization Websites & Twitter (1)

Organization	Website	Twitter
Center for Environmental Science (http://www.ceis.or.jp/)		
Conservation International Japan (http://www.conservation.org/global/japan/)		
Earthday Japan (http://www.earthday-tokyo.org/)		

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Organization Websites & Twitter

Organization	Website	Twitter
Local Governments for Sustainability Japan (http://japan.iclei.org/))		
Institute for Sustainable Energy Policies (http://www.isep.or.jp/)		
Kikonet (http://www.kikonet.org/)		

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Organization Websites & Twitter

Organization	Website	Twitter
Japan NGO Center for International Cooperation (JANIC) (http://www.janic.org/)		
Osaka Ecoplaza (http://www.ecoplaza.gr.jp/)		
PARC (アジア太平洋資料センター) (http://parc-jp.org/)		

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Method

- Used the master list of 107 organizations surveyed in the GEPON (Global Environmental Policy Network) II Survey Japan (2012-13) (Project Leader: Yutaka Tsujinaka, University of Tsukuba, Japan) which are active in the environmental policy arena.
- Selected 9 environmental-related organizations in various sectors that maintain websites and Twitter accounts. Tweets were archived using Nvivo (qualitative software program).
- Analyzed Twitter content over a period of three months (January to March 2017) to investigate Twitter to **provide information** through advocacy, **engage** the public, and **promote** events.

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Definitions

Concept	Definition
Provide information	• Information or links to information about policy, policy papers, reports, newspaper articles, and other general information about the environment. • Reports about past events. • Links to internal information such as organization's website or blog.
Engage the public	• Information or links to information about engaging the public through volunteer activities (includes internship opportunities within organization). • Information about funding (donations).
Promote events	• Information about upcoming events, including events undertaken by other organizations.

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Online presence of organizations on GEPON 2 Japan List

Organization Type	Org's (N)	Online presence				
		Websites	Twitter	Facebook	Youtube	Instagram
Government ministries & agencies (政府官庁) (includes subdepartments)	23	22	8*	1	0	0
Independent advisory & specialty organizations (独立行政法人・特例民法法人)	9	9	3	1	1	0
Political parties & related groups (政党・超党派の議員連盟)	7	7	6	6	4	2
Economic and industry-specific organizations (経済・業種別団体)	19	19	4	4	3	0
Corporations (株式会社)	41	41	8	17	10	3
Environmental NGOs (環境NGO)	20**	20	10	13	7	1
Foundations (財団法人)	30	30	5	8	2	1
Mass Media (マスメディア)	13	13	12	9	4	0
Other (including private organizations) (その他、任意団体)***	6	6	3	1	0	0
Total	168	167	59	48	31	7

*Most departments and subdepartments use the ministry's main website.
**Originally 19 in the codebook but additional online presence was found after 2013,

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Environmental Organization Twitter Profile

Organization name	Twitter account	Twitter Join Date*	Followers (N)*	Following (N)*
Center for Environmental Science (CEIS)	ceis_info	May 2012	35	0
Conservation International Japan	CI_japan	May 2011	3,590	3,563
Earthday Japan (Earthday Tokyo 2017)	Earthday	April 2008	9,245	746
Local Governments for Sustainability Japan (ICLEI)	ICLEI Japan	May 2011	246	158
Institute for Sustainable Energy Policies (ISEP)	isepjapan	July 2010	3,701	132
Kiko Network	kikonetwork	Sept 2009	3,389	241
Japan NGO Center for International Cooperation (JANIC)	ngo_janic	Jan 2010	9,882	3,450
Osaka Ecoplaza	OSAKAecoplaza	May 2013	5,481	6,120
PARC (アジア太平洋資料センター)	parc.jp	June 2010	5,425	606

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Organization Twitter activity (Jan to March 2017)

Organization name	Twitter account	Tweets January to March 2017 (includes retweets) (N)			
		Jan	Feb	Mar	Total
Center for Environmental Science (CEIS)	ceis_info	1	0	0	1
Conservation International Japan	CI_japan	5	7	14	26
Earthday Japan (Earthday Tokyo 2017)	Earthday	4	3	26	33
Local Governments for Sustainability Japan	ICLEI Japan	1	5	11	17
Institute for Sustainable Energy Policies (ISEP)	isepjapan	12	22	7	41
Kiko Network	Kikonetwork	78	78	88	244
Japan NGO Center for International Cooperation (JANIC)	ngo_janic	11	15	23	50
Osaka Ecoplaza	OSAKAecoplaza	3	2	3	8
PARC (アジア太平洋資料センター)	parc.jp	0	3	2	5
Total tweets		115	135	174	425

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Results

Organization name	Twitter account	Tweet Category			
		Inform	Engage public	Promote event	Total
Center for Environmental Science	ceis_info	0	0	1	1
Conservation International Japan	CI_japan	18	2	6	26
Earthday Japan (Earthday Tokyo 2017)	Earthday	6	19	8	33
Local Governments for Sustainability Japan	ICLEI Japan	10	1	6	17
Institute for Sustainable Energy Policies (ISEP)	isepjapan	35	2	4	41
Kiko Network	Kikonetwork	184	31	29	244
Japan NGO Center for International Cooperation (JANIC)	ngo_janic	19	20	11	50
Osaka Ecoplaza	OSAKAecoplaza	4	0	4	8
PARC (アジア太平洋資料センター)	parc.jp	0	2	3	5
Total		276	75	69	425

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Conclusion

- In general, organizations use Twitter for mainly information provision, followed by event promotion and engagement of the public.
- Volunteer organizations (those that rely on volunteers) use Twitter for engagement.
- Some organizations do not make extensive use of Twitter at all (Center for Environmental Science, OSAKA Ecoplaza, and PARC).
- Possible reasons:
  - Organizational information and personnel resources.
  - Uncertainty as to how to use Twitter effectively.

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Greenberg, Josh, and Maggie MacAulay. 2009. "NPO 2.0? Exploring the Web Presence of Environmental Nonprofit Organizations in Canada," Global Media Journal – Canadian Edition, 2:1, 63-88.

Lovejoy, Kristen, and Gregory D. Saxton. 2012. "Information, Community, and Action: How Nonprofit Organizations Use Social Media," Journal of Computer-Mediated Communication, 17:3, 337-353.

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Thank you for listening.

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(Presentation)

A Comparative Study of Environmental Policy Actor Networks in Japan and Germany

Junku LEE

Presentation
XXXVII Sunbelt Conference of the International Network for Social Network Analysis (INSNA)
Beijing, China
May 30 to June 4, 2017

A COMPARATIVE STUDY OF ENVIRONMENTAL POLICY ACTOR NETWORKS IN JAPAN AND GERMANY

Leslie Tkach-Kawasaki and Junku Lee
University of Tsukuba, Japan

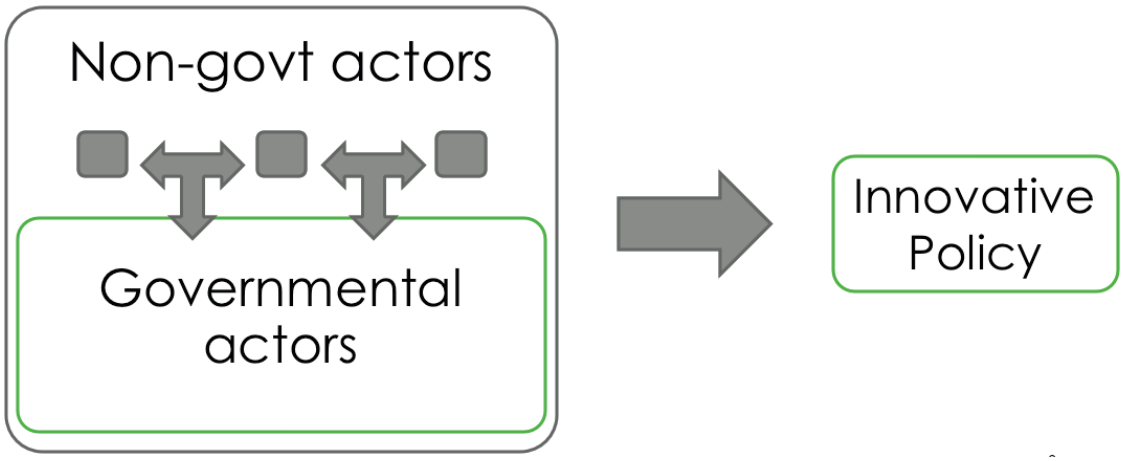
Funding Acknowledgement: The Comparative Energy Policy Discourse Project (CEDP) in Japan and Germany is funded by the Japan Society for the Promotion of Sciences (JSPS) (AAD26048) (Principal Investigator: Leslie Tkach-Kawasaki, University of Tsukuba).

Content

- Background
- Methodology and Data
- Results
- Summary and Future Tasks

Background

Transparency in policy making



Background

Network Governance Theory (Jones, Hesterley & Borgatti, 1997)

- "Autonomous units engaged in creating products or services based on implicit and open-ended contracts"
- Collaborative, co-steering and co-managing (Kooiman, 1993)

Background
Social Media and Network Governance

- New communication pattern
- Ease of entry and information exchange
- Negligible hierarchy

Background
Different Policy Directions

Germany

- Nuclear phase-out since 1980s
- Promoting renewable energy after two oil crises
- A forerunner in the climate change issue

Japan

- Post-Fukushima debate
- Reluctant to promote renewable energy

➡ ***Why are the policies in the two countries different?***

Research Question

- Which actors are influential in each country's climate change policy network?
- What are the differences and similarities in the information exchange network offline and online (social media)?

Methodology and Data

Information exchange

- Information exchange network
  - *Information exchange network captures a silent power structure (Tsujinaka, 2015)*
- Data
  - *Actor lists from the GEPON 2 Japan(2012-13) and GEPON 2 Germany(2016-17) surveys*
  - *"Twitter following" data (March 12 2017)*

Methodology and Data
CEDP

Regional research: Topic-Setting Program to Advance Cutting-Edge Humanities & Social Sciences Research
◆ Topic: New Regional Research Spurred by Information Media Advances
◆ Research Theme: Comparative Energy Discourse & Policy in Japan and Germany (CEDP)

Energy Policy Process
◆ Discourse
◆ Attitudes
◆ Relationships

Research Methods
◆ Interviews
◆ Surveys
◆ Network analysis

Methodology and Data
GEPON Surveys

Global
Environmental
Policy
Networks

GEPON Surveys	Year
GEPON Japan	1997
GEPON Korea	1998
GEPON USA	1999
GEPON Germany	2000
GEPON II Japan	2012-13
GEPON II Germany	2016-17

Methodology and Data
GEPON 2 Japan Response Rate

ORGANIZATIONAL TYPE	TARGET (N)	RESPONSES (N)	RESPONSE RATE (%)
GOVERNMENT OFFICES	23	17	73.9
QUASI-GOVERNMENTAL AGENCIES	9	8	88.9
POLITICAL GROUPS	7	6	85.7
BUSINESS ORGANIZATIONS	19	15	78.9
ECONOMIC CORPORATIONS	41	21	51.2
NGOS	19	12	63.2
FOUNDATIONS	30	15	50.0
MASS MEDIA	13	6	46.2
OTHERS	11	7	63.6
TOTAL	172	107	62.2

Methodology and Data
GEPON 2 Germany Response Rate

ORGANIZATIONAL TYPE	TARGET (N)	RESPONSES (N)	RESPONSE RATE (%)
INTERNATIONAL ORGANIZATIONS	17	0	0
LEGISLATIVE/POLITICAL PARTIES	15	5	33.3
EXECUTIVE AND THEIR ADVISORY ORGANIZATIONS	27	15	55.6
ENVIRONMENTAL INTEREST GROUPS	15	8	53.3
CORPORATE INTEREST GROUPS	21	10	47.6
OTHER INTEREST GROUPS	18	10	55.6
RESEARCH FACILITIES	42	19	45.2
ECONOMIC CORPORATIONS	16	2	12.5
MASS MEDIA	12	2	16.7
TOTAL	183	71	38.8

Methodology and Data
Twitter "Following" Network

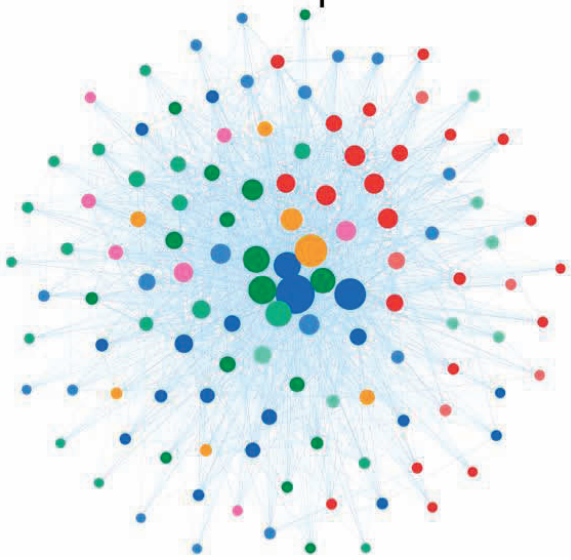
- The accounts and "following" list of the target organizations in each survey
- Network figures for each country
- One integrated network

Methodology and Data
Social Network Analysis

- Actor activity level
  - *Average Geodesic distance*
- Mapping influential actors
  - *Centrality and core/periphery structure*
  - *Comparison of Twitter network with GEPON network*

Results

GEPON 2 Japan Network



- ECONOMIC CORPORATIONS
- GOVERNMENT OFFICES
- NGOS
- BUSINESS ORGANIZATIONS
- FOUNDATIONS

- Avg Distance: 1.822
- Centrality
  - *In-degree: 0.824*
  - *Out-degree: 0.782*
  - *Betweenness: 0.696*
- *Core/periphery: 0.6525(41)*

Results

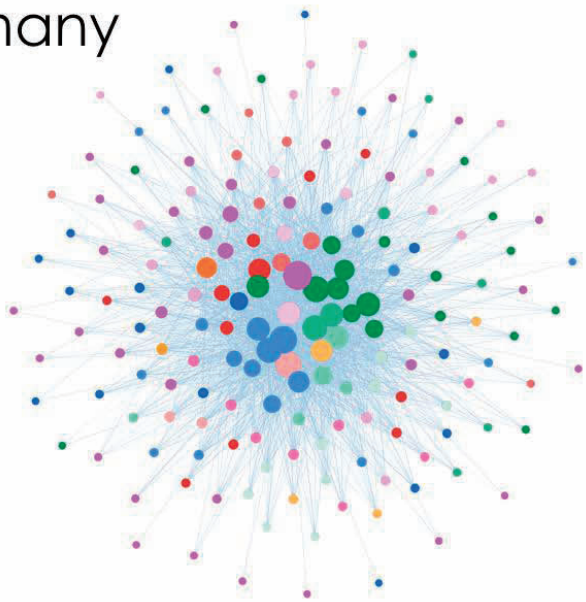
Centrality Top 10 Actors (Japan)

	Degree				Betweenness		Closeness			
	Category	out	Category	in	Category		Category	out	Category	in
1	Gov	0.958	Med	1	Gov	0.284	Gov	0.96	Med	1
2	Gov	0.891	NGO	1	Qua	0.099	Gov	0.902	NGO	1
3	Qua	0.756	Gov	0.95	Gov	0.095	Qua	0.804	Gov	0.952
4	Gov	0.731	Med	0.756	Pol	0.052	Gov	0.788	Med	0.804
5	Qua	0.479	Pol	0.739	Gov	0.04	Qua	0.657	Pol	0.793
6	BO	0.445	Qua	0.723	Med	0.027	CO	0.643	Qua	0.783
7	Pol	0.387	Gov	0.697	Med	0.018	Pol	0.62	Gov	0.768
8	Fou	0.361	BO	0.613	Qua	0.015	Fou	0.61	BO	0.721
9	Pol	0.353	NGO	0.462	CO	0.013	Pol	0.607	NGO	0.65
10	Co	0.345	CO	0.42	NGO	0.012	Eco	0.604	CO	0.633

Results

GEPON 2 Germany

- Avg Distance: 1.452
- Centrality
  - *In-degree: 0.458*
  - *Out-degree: 0.621*
  - *Betweenness: 0.009*
- *Core/periphery: 0.4082(76)*



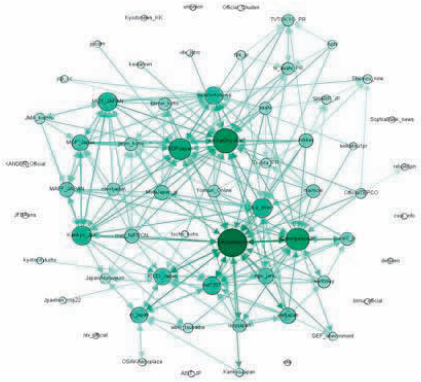
Results

Centrality Top 10 Actors (Germany)

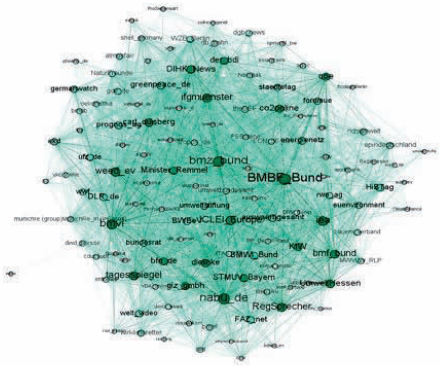
	Degree				Betweenness		Closeness			
	Category	out	Category	in	Category		Category	out	Category	in
1	Env	0.581	CSF	0.743	CSF	0.102	Exe(L)	0.668	SCF	0.765
2	Exe(L)	0.57	Eco	0.676	Exe(L)	0.079	Env	0.668	Eco	0.725
3	Eco	0.542	Eco	0.626	Eco	0.074	Eco	0.651	Eco	0.699
4	CSF	0.542	Fund	0.587	Env	0.066	CSF	0.646	Exe(L)	0.675
5	In	0.525	Exe(L)	0.57	In	0.051	In	0.644	Fund	0.675
6	In	0.497	In	0.564	Env	0.044	Env	0.633	In	0.67
7	Env	0.492	Env	0.553	Eco	0.042	In	0.633	Pol	0.663
8	Env	0.486	Pol	0.547	Exe(B)	0.04	Env	0.63	Exe(B)	0.661
9	Eco	0.48	Exe(B)	0.542	In	0.04	Eco	0.624	Env	0.658
10	Eco	0.464	Env	0.514	CSF	0.034	Eco	0.613	Env	0.651

Results

Twitter "Following" Networks



Japan



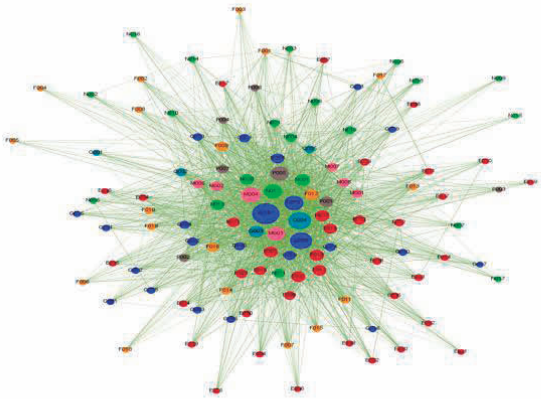
Germany

Summary

- Similarities
  - *Governments are still main actors in the network governance*
  - *Geodesic distance is not quite different*
- Differences
  - *More various organizations participate in the process (Germany)*
  - *Fewer NGOs work with the government & corporate actors (Japan)*
  - *The government actors are strong information provider and NGOs are position of receiver (Japan)*
  - *Research institutes (Germany) and Mass Media (Japan) are play a role of mediator*
  - *Network in Germany is more opened to the other actors*

Future Tasks

- Create a causal inference model of the environmental policy networks and policy outcome
- Compare with other GEPON surveys



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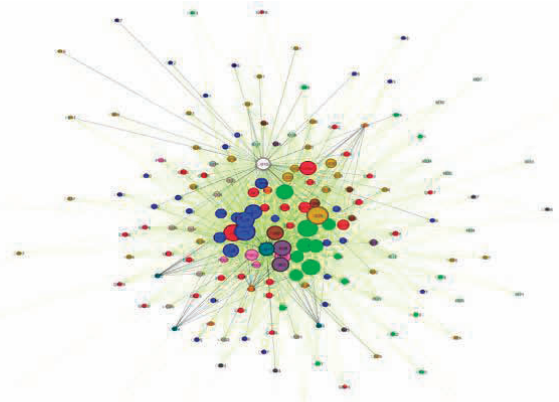

- Avg Distance: 1.452
- Centrality
  - *In-degree: 0.373*
  - *Out-degree: 0.283*
  - *Betweenness: 0.009*
- *Core/periphery: 41cores*

Thank you for your attention

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Post 2015 Paris Climate Conference Politics on the Internet[1]

Social media strategies of political institutions on the environment in Germany and Japan

Manuela HARTWIG

The outcomes of the climate negotiations of the 21st session of the Conference of the Parties (COP21) by the United Nations Framework Convention on Climate Change is the most important since the enactment of the Kyoto Protocol in 1997. With the development of new information technologies since the 1990s public awareness of environmental issues has increased significantly and not only civil society actors but also political institutions and governmental organizations started to use these new tools. The direct communication with citizens, journalists and other interest groups can provide political representatives with a powerful tool to shape public agenda. However, political institutions are traditionally slow in adapting to new technologies and social media services are dominated by individual (one-person) users. Politicians as well as institutions on the Internet must be careful how to facilitate communication online to ensure their political legitimacy. How do governmental organizations involved in climate change politics use social media? This study focuses on the analysis of the official Twitter profiles by the German (@BMUB) and Japanese (@Kankyo_Jpn) environmental ministries and contributes to the understanding of how governmental organizations facilitate new information technologies in the age of democratic transition. With Twitter data of a seven-month period from the beginning of COP21 on November 30 2015 until July 3, 2016, covering three important international events related to climate change politics in total, besides COP21, the pre-COP session and G7 summit (both in May 2016) the characteristics of social media use is being analyzed. Even though Twitter is more popular in Japan, it has not been played an important role in direct communication and information dissemination for political institutions compared to Germany. Moreover, while previous research conclude institutions would avoid interaction on the Internet, the findings suggest differently.

Introduction

Climate change is one of the most important issues nowadays, influencing political decision-making processes that effects various areas and is part of daily discussions. Since the meltdown at the Fukushima Dai'ichi nuclear power plant on March 11, 2011, triggered by a 9.0 earthquake-generated tsunami at the east-cost of Japan, the energy and environmental politics in Japan and Germany are under close public scrutiny. Scholars employ with the question how differences in political decision-making processes can be explained. Both countries have strong economic ties, as well as in diplomacy, technology and knowledge exchange. On the occasion of the G7 meeting in May 2016 in Toyama, Japan and Germany signed a joint statement on bilateral cooperation on the dissemination of low carbon technologies towards transformation to decarbonized societies. Both countries recognize their

[1] This paper has been presented at the CeDEM Asia 2016 Conference of the Danube University Krems, Faculty of Business and Globalization, Department for E-Governance and Administration, held in Daegu, South Korea, December 7 – 9, 2016, and has been published in the conference proceedings. Permission for this reprint has been given by the conference organizers. For the purposes of this report, the format of the paper has been adapted to this report's style format. The content and references remain the same as in the conference proceedings. The conference proceedings can be downloaded via the faculty's webpage. Reference: Skoric, M. M., Parycek, P., Sachs, M. (2017). *CeDEM Asia 2016. Proceedings of the International Conference for E-Democracy and open Government. Asia 2016.* Krems: Donau-Universität Krems.

responsibility for leading the challenge of realizing a decarbonized society during this century by utilizing both countries' technological capabilities[2].

While the Abe administration focuses on the promotion of nuclear energy to reduce CO2 emissions, Germany is known for its strong environmental and green politics. The environmental ministry of Germany was established in 1986 and the green party (*Bündnis 90/Die Grünen*) was founded in 1980. Since 1984 the party is a member of the *Bundestag*, being one of the major opposition parties and experienced the role as ruling party in the coalition with the social democrats (SPD) between 1998 and 2005. Germany is focusing on promoting renewable energies since the late 1980s, gradually moving towards the *Energiewende* since then. Japanese environmental and green politics is in comparison in a different position. The ministry for the environment was established in 2001, being upgraded from the status as an agency and environmental issues are no major issues in political campaigns during general elections. The green party of Japan was founded in 2012. In terms of environment and energy, securing the energy supply and providing a safe infrastructure is one of the main issues. However, since the Fukushima accident, the promotion of renewable energies experienced an increase. In 2012 the Feed-In Tariff law to promote renewable energies went into force. Countries are faced with the challenge to keep the global warming under 1.5°C, managing domestic political and social demands in the wake of the last economic crises at the same time.

The annual conferences held by the United Nations Framework Convention on Climate Change are significant events for international climate change actors. The 21st session of the Conferences of the Parties (COP21) was held between November 30 and December 12, 2015 and the outcomes of COP21 are the most important since the enactment of the Kyoto protocol in 1997. 191 countries out of 197 have signed the agreement on April 22 and according the UNFCCC, 83 countries out of 197 have ratified the Paris agreement by October 5, 2016. This meets the criteria for the agreement to go into force on November 4, 2016. The international regime enforced the importance of COP21, as the environmental ministers of the G7 countries (Canada, Germany, France, Italy, Japan, the United Kingdom, and the United States of America) met on May 15 and 16, 2016 for the first time since 2009, in the advent of the annual G7 summit on May 26 and 27, 2016, in Ise-Shima, Japan. These events have an effect on international and domestic political decision-making processes. However, criticism points towards the publicity effect due to heightened media attention. The measurable effect to formulate definitive political decisions would be negligible, as they lack actual influential power to change climate-related politics (Lück et al. 2016). Based on the last COP sessions since Kyoto in 1997, this argument is valid. Most recent developments require a reassessment of these findings. In general, events on international political cooperation do serve a publicity effect. Yet, they also serve as important means of raising public awareness and interest concerning environmental issues, function as a control mechanism for the international framework and international society, ensure environmental politics remain on the political agenda, and eventually may have a bearing on influencing environmental and energy policy decision-making processes. Moreover, the development of new information and communication technologies (ICT), such as social media services like Facebook or Twitter, increases the range of actors involved in international negotiations to distribute information about their activities and opinions and has increased public awareness of environmental issues (Sampei & Aoyagi-Usui 2009).

The number of governmental organizations using social media has increased in the last few years (Freeman & Quirke 2013) and the main executive institutions of 26 out of 34 OECD countries operate a Twitter profile (Mickoleit 2014). This study contributes to the understanding of how governmental organizations facilitate new ICTs in the age of democratic transition. Using Twitter data of the German (@BMUB) and Japanese (@Kankyo_Jpn) environmental ministries profiles, the analysis examines how these two organizations use the microblogging service in the seven-month period between the start of COP21 on November 30, 2015 until July 3, 2016. Based on the agenda-setting function of governmental organizations, it is vital to analyze the impact and behavior of political organizations to understand how public discourses on the environment in democratic countries are being constructed and change over time.

[2] Source and access to the statement: http://www.bmub.bund.de/themen/europa-international/int-umweltpolitik/europa-internationale-umweltpolitik-download/artikel/deutsch-japanische-klimaschutzerklaerung/ (last access: October 17, 2016).

1. Literature Review

Since the environmental movements in the 1960s and 1970s, climate change and environmental issues take an important part in daily news coverage (Hansen 2015). The function of mass media in influencing public opinion, shaping public discourses and increase public awareness of climate change is particularly salient in Japan (Sampei & Aoyagi-Usui 2009). There is a growing attention in research and academia to analyze the role of Twitter in context of social and political sciences that include politicians and political institutions (Cho & Park 2011, Jungherr 2014). Even though the number of political actors using social media has increased, they are latecomers in this online ground. Moreover, governmental organizations are slow in adapting to social changes (Freeman & Quirke 2013).

Research about social media in politics has thus far focused on politicians and political campaigns. Politicians and individual profiles have a higher popularity in social media than institutions (Mickoleit 2014) and the use of social media has both advantages and disadvantages. Even though politicians are actively engaged in online communication, their communicative behavior and responses show evidence that they are concerned about becoming victims of critical mistakes (Cho & Park 2011) and always try to save their face and not embarrass themselves (Otterbacher et al. 2013). The main objective of institutions is to disseminate information and not to facilitate interaction. Moreover, Otterbacher et al. (2013) conclude they actually try to avoid interaction. Their first goal is to protect themselves and their politics. To open the doors for more interaction and vertical communication poses risk to lose political power. Political institutions need to take online discussions for the policy making process into account (Hsu et al. 2013) and a skilled use of social media by political institutions could contribute to increase transparency and accountability of politicians and governmental organizations (Cho & Park 2013, Hemphill et al. 2013). The motives between individual or personal profiles and institution's or organisation's profiles differ and so do the means of social media communication strategies (Mickoleit 2014). However, Mickoleit (2014) found that only few among OECD countries so far have an actual social media strategy. This shows not only uncertainty among the governments about the correct use of social media (Mickoleit 2014) but raises the question of personnel and resources.

Governmental organizations in democratic countries rather use ICT primarily as an additional channel to distribute their information than engage in interactive communication (Freeman & Quirke 2013, Hemphill et al. 2013, Mickoleit 2014). Providing information and position taking is most common, while requests for action are negligible (Hemphill et al. 2013). Issues on climate change are complex, which makes it difficult to harness social media for interactive engagement and involve citizens in the political decision-making processes.

Studies about political institutions and their social media behavior are rare and fragmented, because social media and new ICT are fairly young and as such its use by political actors in an early phase of development (Hemphill et al. 2013, Jungherr 2014). With the increasing role of social media in political communication, it is necessary to re-examine how public discourses are being created. Social media can help to increase the awareness of particular messages. Examining online communication and discussions on issues concerning their society can provide better understanding of their reactions to these issues (Hsu et al. 2013).

The effects of climate change on the environment have been scientifically proven and are in itself a major issue. How a society perceives and communicates these issues, in other words, the public's understanding of climate change, and how social problems around climate change are being constructed, differ. The constructivist sociology explains how and why social problems come into existence and it recognizes the importance of the cultural context (cultural resonance perspective) in terms of construction of social problems (Hansen 2015). The government and its related institutions are still the main agenda-setter. Increasing the public understanding of the effects of climate change and the implementation of politics ensures political reliability. Institutions set norms and rules on which people can act. Effective measures against climate change are highly dependent on individual action taking in daily live. Political scientists are being criticized to have ignored the study of discourses (Habermas 2008, Schmidt 2008) and the discursive institutionalism emphasizes the importance of ideas and discourses in the context of institutions and takes a more dynamic perspective of change into account than traditional institutionalists do (Schmidt 2008). According to Habermas, communication is essential for social integration and effective policy implementation. It is important to understand how institutions communicate with the public, how communication strategies change over time and why certain politics

are more effective than others. From the study of behavior the actual impact of public communication poses analytical problems. By applying analytical concepts on social media communication, user interaction and the available profile data, this paper proposes an approach to overcome this problem.

2. Characteristics of Twitter

(1) Twitter demographics

Twitter is a microblogging social network service (SNS) on the World Wide Web with which people can instantly share information, include links to other websites, within a short message called tweet of 140 characters with the Twitter community called tweet. Tweets can be shared (called retweet) by other users. The retweet increases the impact-rate of the original tweet, because it makes the original tweet visible by the retweeter's user network, called "snowball effect" (Mickoleit 2014). Additionally, being "mentioned" (recognizable with the "@" mark in front of a profile's name in the tweet) in other users' tweets increases popularity and attention (popularity bonus) (Mickoleit 2014). However, previous researches find that political leaders are more popular than institutions (Mickoleit 2014). The character of interaction in new ICTs is changing the nature of communication between politics and citizens (Kahn et al. 2013). Twitter is among the top ten social network services worldwide. In May 2016, Japan ranked four in the number of active Twitter users[3]. According to social media statistics, the daily use of Twitter in Japan in 2015 was higher than in Germany. The impact rate of Twitter in terms of governmental institutions profiles in Japan is higher than in Germany (section 4) and Twitter is the sixth most popular social network in Germany[4]. In both countries, the under 30 year-old dominate the social network population.

(2) Political institutions on Twitter in Germany and Japan

All eleven ministries of the Japanese government have a Twitter account. In terms of the number of Followers, @Kankyo_Jpn is ranked six. The ministry with the highest number of followers is the Ministry of Defence (@bouei_saigai) with 662.000 followers[5]. One cannot deny a correlation between the creation of profiles and the earthquake-tsunami-nuclear catastrophe in March 2011 on the east-cost of Japan: The Ministry of Defence created its profile in March 2011, the Ministry of Environment in April 2011 and the Ministry of Economy, Trade and Industry (@meti_NIPPON) also in March 2011. Only the Ministry of Health Labor and Welfare (@MHLWitter) is on Twitter since before the catastrophe (since August 2010) and was the first of the eleven ministries to join the microblogging service. From the number of tweets, the Ministry of Foreign Affairs (@MofaJapan_jp) has the highest number of tweets (18.900); more than double as @mextJapan (Ministry of Education, Culture, Sports, Science and Technology) that is on rank two in terms of number of tweets with 7,200. @Kankyo_Jpn however has compared to the other profiles the fewest number of Tweets; 1,331 by October 2016. This is not necessarily typical for the Twitter community in Japan. These numbers can provide insights, what topics the Twitter community in Japan is interested in: Security, Welfare, Education & Culture, Foreign Affairs, Infrastructure & Tourism, Environment, Economy & Industry, Internal Affairs, Finance, Justice and Forestry & Fisheries – in that order (based on the number of followers). Even though the @Kankyo_Jpn is in the average in terms of followers, the rather passive social media activity raises the question whether the ministry misses an opportunity (political opportunity structure) to increase their reach. Similar to Japan, the Federal Ministry for Defence (@bundeswehrinfo) and the Federal Foreign Office (@AuswaertigesAmt) dominate Twitter in terms of number of tweets among the 14 federal ministries. All of them facilitate a Twitter profile and some more than one. The Federal Foreign Office operates a profile in German (@AuswaertigesAmt) and in English (@GermanyDiplo). The number of tweets over time in relation to the time the profile is active is compared to the Japanese institutions not

[3] https://www.statista.com/statistics/242606/number-of-active-twitter-users-in-selected-countries/ (last access: October 17, 2016)

[4] https://www.statista.com/statistics/429496/frequency-of-social-media-usage-in-germany-by-social-media-site/ (last access: October 28, 2016)

[5] The numbers reflect the situation of October 2016. It is important to note that a situational description of social media data experiences changes in short time. But the general tendencies in this analysis is not expected to experience a drastic change in the general core.

much different. In terms of the number of followers, the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (@BMUB) is on rank two, after the Federal Foreign Office.

3. Method

(1) Variables

A mixed method approach has been used to analyze the twitter profiles quantitatively in terms of their social interaction and network strategies (sociogram), and number of tweets (impact and behavior), qualitatively in terms of tweet content and hashtags. Hashtags categorize the tweet (Cho & Park 2012), which can be used to analyze the institution's social media strategy. An approach to measure the impact of Twitter profiles has been performed following the quantitative behavioral analysis. The following two variables are the focus of this analysis to measure the environmental ministries' social media behavior and impact by using Twitter data: Number of tweets in a time series analysis to measure the behavior and the number of followers to measure the impact.

(2) Data collection

Twitter data for the Japanese Ministry of the Environment (@Kankyo_Jpn) and the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (@BMUB) were downloaded through the NVivo tool for Windows Internet Explorer: NCapture. Through this tool tweets and profile information were archived as a dataset, including retweets and mentions. Table 1 summarizes the size of the datasets as well as demographic information for both Twitter profiles. Compared to @BMUB, the fewer number of total tweets by @Kankyo_Jpn since the profile's existence to the time this analysis was performed (1,331) allowed to archive (almost) all tweets of this profile (1,212). The number of tweets by @BMUB (8,388) since the profile is active is much higher. The size of the dataset is in relation between total number of tweets and available tweets for archiving fewer (2,986 of 8,388), but compared to @Kankyo_Jpn still higher.

Table 1: Twitter profiles' general information and dataset size for @BMUB and @Kankyo_Jpn.

	@BMUB	**@Kankyo_Jpn**
Profile online since	July 2010	April 2011
Total number of tweets by October 27, 2016	8,388	1,331
Dataset size (number of available Tweets)	2,986	1,212
Number of tweets in the seven- month period	1,853	212
Date of oldest Tweet archived	Aug. 8, 2015	May 27, 2013
Number of followers by October 27, 2016	58,500	152,000
Number following by October 27, 2016	459	43

(3) Data preparation

Identifying main international events to define the time frame for analysis helps to understand how governmental organizations are using social media. Prior to the G7 Summit on May 26 and 27 2016 in Ise-Shima, Japan, environment ministers from G7 countries and the European Union held a meeting on May 15 and 16 in Toyama, Japan. The datasets have been filtered first for the main time frame of a seven-month period between November 30 2015 and July 3 2016, as well as for each event as summarized in Table 2. The main dataset consists of *tweet ID, username* (recognized with the "@" sign), *tweet, time, tweet type, retweeted by* (name of Twitter profile that shared the original tweet), *number of retweets, hashtags, mentions, name* (different from username), *location, web* (link to a website, if included in the Tweet), *bio* (description of the profile that either created the Tweet, retweeted or mentioned a Tweet), *number of tweets, number of followers, number following*, and *location coordinates*. In terms of security and privacy policies, case sensitive information has been cleared from the dataset.

Table 2: **Events used for pinpointing the Twitter dataset.**

Event	Time	Place
COP21	November 30 to December 12, 2015	Paris, France
Pre-COP (COP22)	May 16 to 26, 2016	Bonn, Germany
G7 Toyama, Environment Minister's Meeting	May 15 & 16, 2016	Toyama, Japan
G7 Summit	May 26 & 27, 2016	Ise-Shima, Japan

4. Results

(1) Variable: Number of tweets in a time series (behavior)

To provide a better understanding of Germany's and Japan's environmental ministries' social media behavior, the Twitter profiles of all G7 countries' environmental ministries are being compared in terms of number of tweets in a time series analysis for the aforementioned seven-month period. The difference between @BMUB and @Kankyo_Jpn represents two extremes. While @BMUB is rather active and makes strategic use of international events as the tweet-frequency increases during the defined time frames, @Kankyo_Jpn on the other hand has besides Italy the lowest tweet-frequency and shows no significant reaction at the time of the events. The content of Twitter is changing in a matter of minutes or sometimes seconds, depending on the topic and size of user network involved in tweeting. There is a risk a tweet can be overlooked, if the timing is ill chosen or a large community shares tweets at the same time.

In general, COP21 was an important event that effected social media behavior, while G7 and the environment ministers' meeting had less effect. 15.7% of all tweets during the seven-month period by @BMUB was made during COP21 (1,853), and 13.2% (212 tweets in total during the seven-month period) in case of @Kankyo_Jpn. As for the pre-COP22 session between May 16, 2016 and May 26, 2016, the number of tweets by @BMUB is 4.6%, and 8.0% for @Kankyo_Jpn in relation to the total number of tweets in the seven-month period. Even though, the G7 environmental ministers met for the first time since 2009, this meeting can be considered negligible in terms of its effect on the social media behavior. Because environmental issues are only one part of the G7 agenda, and even though G7 Summits attract media attention, it is not an issue to be introduced to the Twitter community by the governmental organizations.

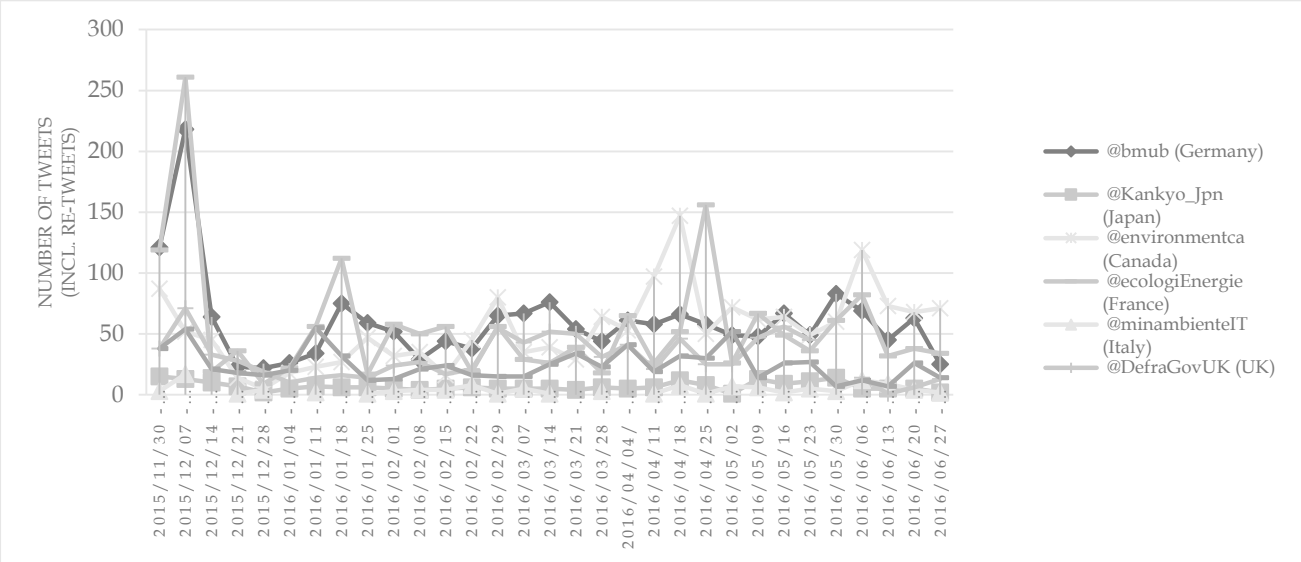

Figure 1: Time series of G7 countries' environmental ministries' Twitter profiles tweeting behavior.

(2) Variable: Number of followers (impact)

This section proposes a methodology to measure the impact rate of political institutions on Twitter. Mickoleit (2014) provided the general approach to analyze the number of followers in relation to the

general population. As discussed above, Twitter is more popular in Japan than in Germany, thus, the impact rate is higher through all eleven ministries compared to their German counterparts. The high impact rate of @BMUB (ranked two among all 14 ministries) reflects general findings of the importance of environmental issues in Germany as shown in Table 3. However, the measure of the impact rate based on the number of followers must be treated with caution as it represents only one side of the interaction. It is not possible to evaluate, whether users actually follow the ministries' profiles. Sections 4.3 and 4.4 aim to shed light on the interaction behind the follower-following relationship.

Table 3: Twitter impact rate (%) of German and Japanese ministries.

Japan	Impact rate	Germany	Impact rate
Ministry of Defence (@bouei_saigai)	0.53	Federal Foreign Office (@AsuwaertigesAmt)	0.56
Ministry of Health, Labour and Welfare (@MHLWitter)	0.33	**Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (@BMUB)**	**0.07**
Ministry for Education, Culture Sports, Science and Technology (@mextjapan)	0.23	Federal Ministry for Family, Elderly, Women and Youth (@BMFSFJ)	0.06
Ministry of Foreign Affairs (@MofaJapan_jp)	0.17	Federal Ministry for Economic Affairs and Energy (@BMWi_Bund)	0.06
Ministry of Land, Infrastructure, Transport and Tourism (@MLIT_JAPAN)	0.13	Federal Ministry of Defence (@bundeswehrinfo)	0.05
Ministry of the Environment (@Kankyo_Jpn)	**0.12**	Federal Ministry for Economic Cooperation and Development (@BMZ_Bund)	0.04
Ministry of Economy, Trade and Industry (@meti_NIPPON)	0.12	Federal Ministry of Finance (@BMF_Bund)	0.03
Ministry of Internal Affairs and Communication (@MIC_JAPAN)	0.10	Federal Ministry of Justice and Consumer Protection (@BMJV_Bund)	0.02
Ministry of Finance (@MOF_Japan)	0.10	Federal Ministry of Food and Agriculture (@bmel)	0.02
Ministry of Justice (@MOJ_HOUMU)	0.09	Federal Ministry of Education and Research (@BMBF_Bund)	0.02
Ministry of Agriculture, Forestry and Fisheries (@MAFF_JAPAN)	0.03	Federal Ministry of Health (@BMG_Bund)	0.02
		Federal Ministry of the Interior (@BMI_Bund)	0.02
		Federal Ministry of Transport and Digital Infrastructure (@BMVI)	0.02
		Federal Ministry of Labour and Social Affairs (@BMAS_Bund)	0.01

*Impact rate=Number of followers in relation to the general population. Germany: 81,292,400 (Source: DeStatis); Japan: 125,891,742 (Source: Soumu).

(3) Analytical approach of communicative interaction (network strategy)

This section explores the graphical representation (sociogram) of the online communication interaction of the Japanese and German environmental ministries' Twitter user profiles to find out to whom the governmental organizations maintain connections and what it can say about their social media behavior. Based on the findings in the previous section in terms of impact rate and popularity of Twitter in general, the network strategy analysis adds value to the previous analyses.

Figure 2 shows a highly interactive communication network by @BMUB with ties to mainly profiles of mass media companies and journalists. This supports the agenda-setting function of the ministry and the strong position within politics in Germany.

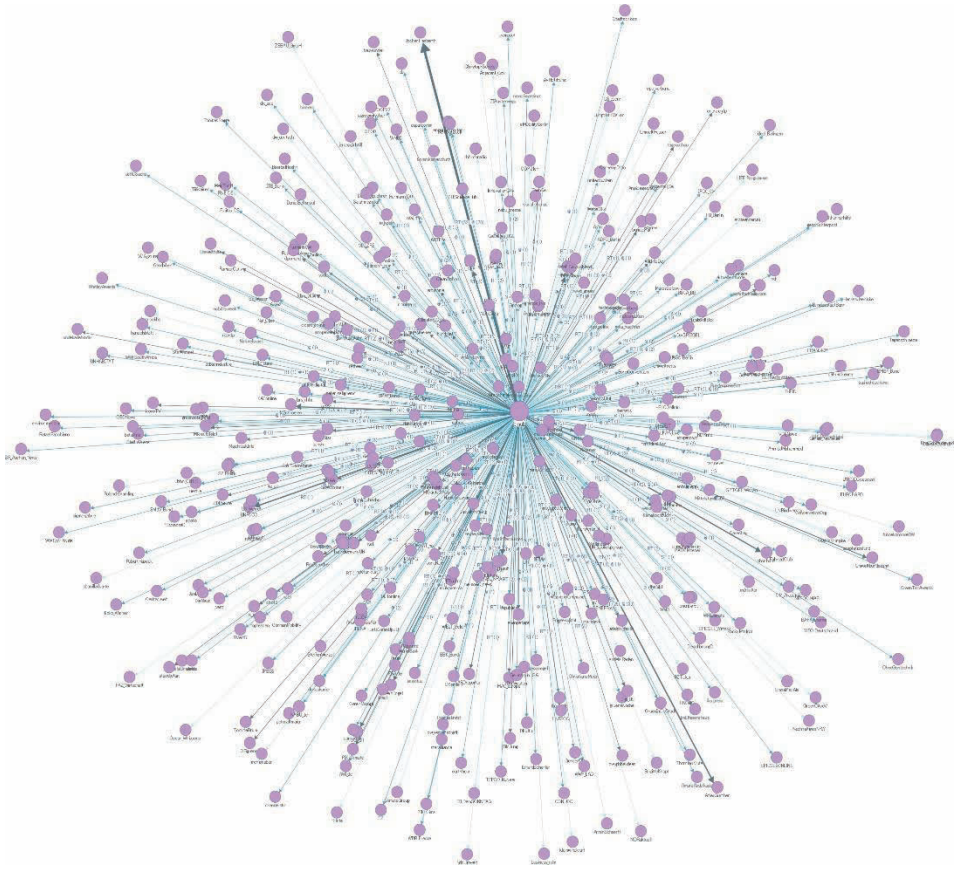

Figure 2: Twitter sociogram of @BMUB.

@Kankyo_Jpn revealed a quite different shape, compared to @BMUB, as shown in Figure 3. It is strikingly different in terms of the number of connections. A communicative interaction network is negligible. It maintains its strongest tie to the Twitter profile of the Ministry of Health, Labor and Welfare of Japan (@MHLWitter), but due to the few number of retweets and mentions it has no notable range in the Twitter community. Based on these findings, the MoE could be considered as weak and not influential in terms of shaping public opinion on the Internet.

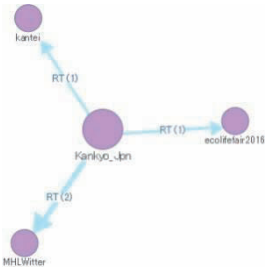

Figure 3 Twitter sociogram of @Kankyo_Jpn.

(4) Tweet content and hashtags: A qualitative approach

Hashtags describe keywords Twitter user assign when using the hashtag sign (#) in front of the term. With this method a Twitter user puts emphasis on a topic he/she wants to share with the Twitter community. Looking more qualitatively into the content of the Tweets by @BMUB showed and extensive use of hashtags compared to @Kankyo_Jpn, while @Kankyo_Jpn practically does not use hashtags at all. Even though @BMUB creates a comparatively great amount of hashtagged terms (143 alone during COP21), because almost all of them are used only ones, these issues have a short life-span.

However, the available data does not contain information, whether a wider Twitter community is adapting these hashtags, which would support an agenda-setting function in social media by the ministry.

In terms of tweet content, the qualitative analysis may suggest slightly different conclusions than the quantitative analysis. @BMUB mainly focuses on informing about the environment minister's activities and the ministries' achievements in terms of projects and campaigns. After "COP21", the name of the German environmental minister "Hendricks" is the most often used hashtag term. The hashtagged term "Klima" (climate) comes third. With the intense use of hashtags, the formulation of a complete (even short) sentence is very rare. Sometimes tweets by @BMUB would consist only of hashtags. This way of using social media suggests, that @BMUB is focusing its activities strongly around popular issues and (local) events, which produces the image of being actively engaged and promoting interaction. However, this behavior actually questions the sustainability of discussed issues and thus, may have less influential power to shape public opinion than initial results would suggest.

@Kankyo_Jpn on the other hand may present itself fairly passive in social media, but might be more sustainable. It tries to promote general behavioral shifts in the society by publishing tweets requesting specific activities directly, that increases the awareness of environmental issues and climate change politics at the same time, instead of focusing their messages on (local) short-lived events. For example, requests for saving water, energy and CO2 emissions by informing about released campaigns: "Think about global warming – Starting 'CO2 reduction/Light down campaign' Please cooperate", "Be eco when do every day shopping", "Not only NPOs, corporations or economic organisations, individual people can help create a system where society and environment have a good life together, too"[6]. Considering the number of followers (111,881) this may suggest that despite the quantitative findings discussed above, @Kankyo_Jpn could have more influential power in shaping public discourse through social media than first results would indicate.

5. Conclusions

The findings suggest main differences in means and motivation of social media use by political institutions in Japan and Germany. The Twitter community in Japan is more fragmented and has no unified social media strategy of any. Based on the findings Germany seems to facilitate a more outlined social media strategy across institutions and is more interactive based on the number of followers and following, as well as likes, among the G7 countries. @BMUB's ties are dominated by mass media and journalists, which supports the ministry's agenda-setting function. But the character of the interaction suggests a rather closed network in terms of connections that might hinder individuals to be part in the exchange of thoughts, opinions and ideas. Additionally, an alleged high interaction rate does not necessarily prove to have more influence, as the passive receiver of a message must be taken into account as well as the content of the message. Yet, the effect on the passive receiver is analytically difficult to grasp, but based on communication and media studies, it is known that active engagement alone is not the main factor to shape public opinion (for example TV) (Otterbacher et al. 2013). The results suggest similarities between online and offline agenda setting role of environmental ministries in both countries. This confirms Hemphill et al.'s findings that public officials do not alter their communication strategies between media but rather use a common strategy across different media.

The existence of ICT and use of social media to promote vertical communication between politics and citizens does not automatically lead to new social systems, because the way communication and interaction happens in a society is being reflected on their online behavior. On the other hand, as @Kankyo_Jpn's Twitter activity is far more passive when comparing the total number of Tweets as well as their network strategies (sociograms) including retweets and mentions with @BMUB, the total number of @Kankyo_Jpn's followers can be interpreted as a potential to raise the ministry's public attention on their agenda. In terms of post-COP21 environmental politics, the content of the Tweets show no significant change. However, @BMUB is highly influenced by international and domestic events related to environmental issues and climate change politics in terms of their tweeting activities. The number of followers and following is increasing frequently. This analysis is in that regard limited as it is only capable of explaining a snap-shot and the question remains whether governmental organizations should use social media and increase their "popularity bonus". Considering the relation

[6] Translation from Japanese into English by the author.

between @BMUB and mass media on Twitter, its engagement in online public discourses and in case of @Kankyo_Jpn to actively request change of behavior, it is important to reconsider the role of political institutions and governmental organizations in the current phase of democratic transition.

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Social Network Analysis of the Network of NGOs Participating in COP21:

A Comparative Analysis of the Twitter Network in Germany, Japan, and South Korea[1]

Junku LEE

Keywords: UNFCCC, COP21, Global Governance, NGO, Social Network Analysis, Twitter

Introduction

The climate change issue is one of the major problems facing the international society. The deepening of globalization has led to various issues beyond individual national states that have been in the territory of individual national states, such as security, economy, human rights, and environment, etc. and global governance is highly required in the international society. The international society is responding as one of the most important international issues to the climate change issues which both cause and effect are global as one of the most important international issues. Based on the awareness of the climate change issue, starting with the publication of the reports of the Club of Rome which title is "The Limits to Growth" in 1972, the international society has begun to build a global environmental regime as a diverse form of international cooperation system to solve the environmental issue.

These efforts from the international society, at the United Nations Conference on Environment and Development (UNCED) held in Rio in June 1992, have led to the adoption of United Nations Framework Convention on Climate Change (UNFCCC) which is the most influential international regime on the current climate change issue.

At the First Conference of the Parties (COP 1) of UNFCC held in Berlin in 1995, countries agreed existing UNFCCC would not be able to meet to achieve the long-term goal of reducing global greenhouse gas emissions, and that with the goal of limiting and reducing greenhouse gas emissions within a certain period. The states party to UNFCCC, at the Third Conference of the Parties (COP 3) held in Kyoto in 1997, adopted the Kyoto Protocol which 37 Annex I Parties include the industrialized countries that were members of the OECD, countries with economies in transition, including the Russian Federation, the Baltic countries and several European countries reduce greenhouse gas emissions from 2008 to 2012 by 5.2% compared to 1990. And for making the Kyoto Protocol possible, the Kyoto Mechanisms, which are Clean development mechanism (CDM), Joint Implementation (JI), Emissions trading (ET), was created as a flexible mechanism. Since then, the Kyoto Protocol in UNFCCC has served as a basic framework until the 2020 Paris Agreement with many twists and turns like Adoption of the Marrakesh Accords to discuss of legal binding for noncompliance at the COP11 held in Montreal in 2001, Refusal to ratify of the United States in 2001 and withdrawal of Canada.

To end of Kyoto Protocol by 2020, the participants of UNFCCC have been pursuing the establishment of a new climate change treaty that will complement the Kyoto Protocol. By agreeing to the opposition and raising issue of the Parties to the principle of 'Common but Differentiated Responsibilities(CBDR)' that is the great feature of the Kyoto Protocol, and the of greenhouse gas emissions from countries that they are not in Annex 1 Parties group, at COP17 in 2011, a new consensus was reached, and the post-Kyoto system was announced. At COP18 held in Doha in 2012, it was agreed to extend the Kyoto Protocol by 2020 and to

[1] This paper is based on a presentation entitled “Social network analysis of the influence of participation in the international environmental regime: The Twitter network of participating NGOs in Germany, Japan and Republic of Korea in COP21,“ presented at DISC 2016/4th WATEF International Conference (World Association for Triple Helix & Future Strategy Studies), December 8, 2016.

finalize the new climate regime by 2015 and at the COP19 held in Warsaw in 2013, the "Intended Nationally Determined Contributions(INDCs)" that is the great feature of the Paris Agreement and approach that everyone does what they like, has determined. At the COP21 in Paris, with the successful adoption of the Paris Agreement, which was agreed by 195 of the 197 state parties, the Paris agreement launches the next era from 2020 after the Kyoto protocol.

1. Theoretical background and Review

(1) Global regime and global governance

The most widely used definition of the global regime is the definition of Krasner. He defines the regime, "Sets of implicit or explicit principles, norms, rules, and decision-making procedures around which actors' expectations converge in each area of international relations" (Krasner, 1982). He also explains four elements of the regime. The first is principles of facts, causality, and beliefs about rightness; the second is norms such as the standards of behavior defined as rights and obligations. The third is rules that include specific instructions and prohibitions, and the last is decision-making procedures.

According to Young, Governance systems solve conflicts and facilitate cooperation, and more generally, it is important to establish and operate an international system in which the global society that is made up of interdependent actors and they can resolve the problem by collective action. And the global regime is designed to cope with the particular issues and fields of this global governance system. Also, according to Stokke, in the researchers on regimes tend to be more nationalistic and focus on rules in the international society centered on nation-states, while in global governance researchers focus on the diversity of actors who form and conduct rules and orders along with the phenomenon of the regime.

(2) Expansion of the NGO role in global governance

In global governance, NGOs have an important position. And, they are expanding their role by complementing the limits of national-centered governance by finding their own needs and superiority in new environments in the global society, such as the provision of expertise, the creation of public opinion, mobilization of protests and education. Participation and cooperation of NGOs as the actors of civil society, along with the non-national actors who are international organizations and transnational corporations are key actors of global governance.

The fact that NGOs play a key role in global governance is closely related to the emergence of international society as an actor of NGOs through globalization. With the advent of the internet, which has The free flow of information and a significantly lower physical limit compared to the past, as a means of communication due to the development of science and communication technology, the scope of activities of NGOs limited to individual countries has expanded to the global level, and they have begun to raise voice various issues on a global scale. (Mathews, 1997).

NGOs that have started to grow explosively since the 1980s have begun to expand their influence in the international society through criticism and surveillance as a new actor outside the existing nation-states who played the role of the main actor in the international society. The activities of NGOs began to become energetic at first in areas with strong global and transnational characteristics such as peace, environment and human rights.

The United Nations Conference on the Human Environment (UNCAGE) in 1972, which is the early global governance mechanism in the field of environment, approximately 300 NGOs began participating as observers, and approximately 1,400 organizations participated in the Rio de Janeiro Earth Summit in 1992, which played an important role in the development of international environmental regimes. Also, at the Fourth World Conference on Women in Beijing in 1995, 3,000 accredited NGOs were approved for participation (Clark et al., 1998). NGOs have also played a role, albeit partially, in the military issue, which is the exclusive territory of the nation-states. International Campaign to Ban Landmines (ICBL) is a prime example. About 350 NGOs around the world cooperated, and they informed and campaigned about the seriousness of the damage caused by and the inhumanity of anti-personnel landmines. They finally succeeded in getting the treaty backed by 89 nations in the Oslo Diplomatic Conference on an International Total Ban on Anti-Personnel Land Mines held in Oslo in September 1997 (Price, 1998).

The role of NGOs in terms of global governance has taken a rapid pace since the Commission on Global Governance published the report “Our Global Neighborhood” in 1995, and in 1998, the United Nations formally recognized the participation and role started to set up a practical system of NGOs in global governance through the report of the UN Secretary-General entitled “Arrangements and practices for the United Nations system of non-governmental organizations”. It can be seen as the beginning of the UN’s

crucial policy shift towards the status of NGOs, which began to make a position itself by the core of global governance.

The expansion of the influence of NGOs is due to the important characteristics that NGOs have. Clark et al. point out two comparative advantages that NGOs have over governments. First, NGOs are more effective because they can focus on a single issue, compared to governments that must perform complex functions. Second, in the issue based on principles and values, the government tends to subordinate or ignore under other policies depending on the priority of policy, while NGOs can act immediately. However, even though this comparative advantage of NGOs could be an advantage for NGOs during participating in global governance, but it does not necessarily guarantee participation. Nowadays, the participation of NGOs as an actor in the global governance is still allowed by the nation-state who they have the voting right. The main reason why countries are obliged to engage NGOs in the field of global governance is that the huge influence of NGOs. It means, it is very important that NGOs play an important role in securing the legitimacy of global governance.

NGOs can influence the legitimacy of the international community through mobilization of public support, the formation of public opinion, practical experience and expertise from field activities (Price, 1998). In addition, although participation of NGOs to the global governance is limited to consultative status in only areas where it is possible for nation state can make concessions and not allowed to participate in the official decision-making process, NGOs seek to gain their influence into the decision-making process through informal and various ways, and these activities of NGOs lead to greater influence of NGOs in the role of global governance drastically.

(3) NGOs and networks

The most distinctive characteristics of NGOs in comparison to nation-states or transnational corporations is the establishment of networks with the horizontal relationship for cooperation and collaboration. According to Guo and Acar "Nonprofit collaboration as what occurs when different nonprofit organizations work together to address problems through joint effort resources, and decision making and share ownership of the final product or service" (Guo & Acar 2005). In this social network, the relationship of actors and the flow of resources is interdependent, and the analytic unit is not individuals, but the connections by individuals and their associations.

In the international society, the network of NGOs has grown remarkably. NGOs have emerged as actors of global governance and have been influencing the agenda setting and policy formation process in the international society with collaboration and cooperation variously. As mentioned above, the development of traffic and information communication technology has made travel and information exchange a convenient for networking.

The network of NGOs provides usefulness to NGOs in a variety of ways. The network of NGOs can help other NGOs as a useful solution in a situation to be hampered by domestic or local activities against their governments or infringers. That is, local and domestic NGOs use global networks to appeal their claims to international society and their right to be infringed, by which they can exert a stronger influence on their governments and infringers through the pressure of global network. Also, the global network of NGOs gets the opportunity to develop through communication with other various organizations such as participating in international conferences, protests, and online communications. Through these exchanges, large NGOs provide small NGOs with access to varied resources, educational opportunities, and information, and small NGOs identify large NGOs with the increase of the actors and connections of the networks and the colleagues who are operating together (Keck & Sikkink 1998).

The global network of NGOs has become an important mechanism for establishing international solidarity beyond nation-states and region and spreading the values, tactics, and behavior of people in various countries and peoples in the network age. By the global NGO network, particularly, it is possible to develop reliable countermeasures and to conduct public opinion and the information on issues that individual NGOs are hard to handle. In other words, participation in the global NGO network encourages the social movements at the local level where small organizations are main actors and promote networks to enable local and national issues to develop into the global frame.

2. Research Purpose and Method

(1) Purpose

Various researchers are focused on the impact of NGO participation on global governance and the global regime, but there are not many types of research on the impact of global governance and the global regime

on the networks of NGOs. Thus, this paper compares the quality of network with the participation in the global regime by analyzing online networks of NGOs in Germany, Japan, and South Korea who participated to COP21, and analyzes how the network is changing before and after participating in the global regime. At last, this paper evaluates the network of NGOs in three countries.

(2) Methods and Data

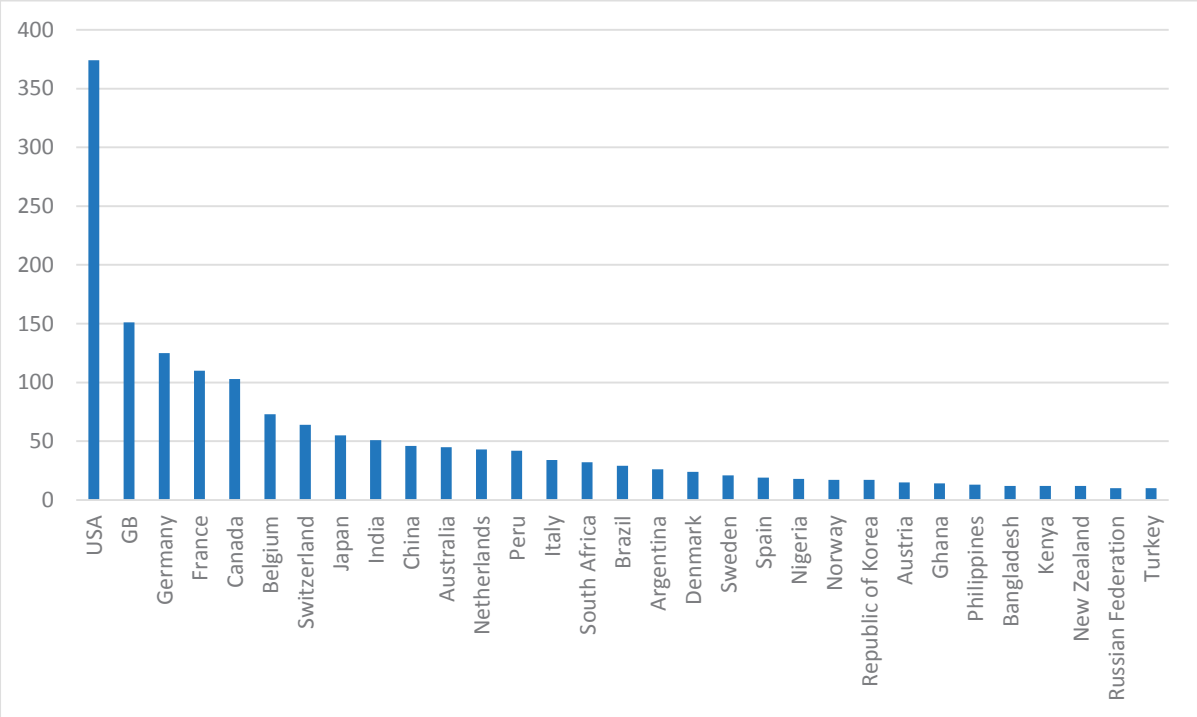

Figure 1. The Number of Admitted NGOs by Nationality

For Assessing the network of NGOs that are part of the global regime, at first, making the list of 1866 admitted NGOs by the UNFCCC for the COP21, and except for the United States because of too many organizations comparatively and countries which have 10 or fewer. Finally, 125 organizations of Germany, 55 organizations of Japan and 17 organizations of South Korea are selected.

For the social network analysis of online level, this paper uses following/follower data of Twitter as one of the representative social media. For data collection and analysis, Python is used for data collection and organizing, and Gephi and Ucinet are used for the analysis and the visualization.

3. Results: Follow Network

		combined	Germany	Japan	South Korea
nodes		96(79)	71(63)	16(7)	9(7)
edges		514	481	10	18
average degree		5.354	6.775	0.625	2
density		0.056	0.097	0.042	0.25
centralization	degree	0.243	0.312	0.181	0.482
	betweenness	0.1187	0.177	0.067	0.267
reciprocity	Arc	0.533	0.536	0.6	0.556
	Dyad	0.363	0.366	0.429	0.385

Table 1. The measure of the networks of NGOs

(1) The combined network of three countries

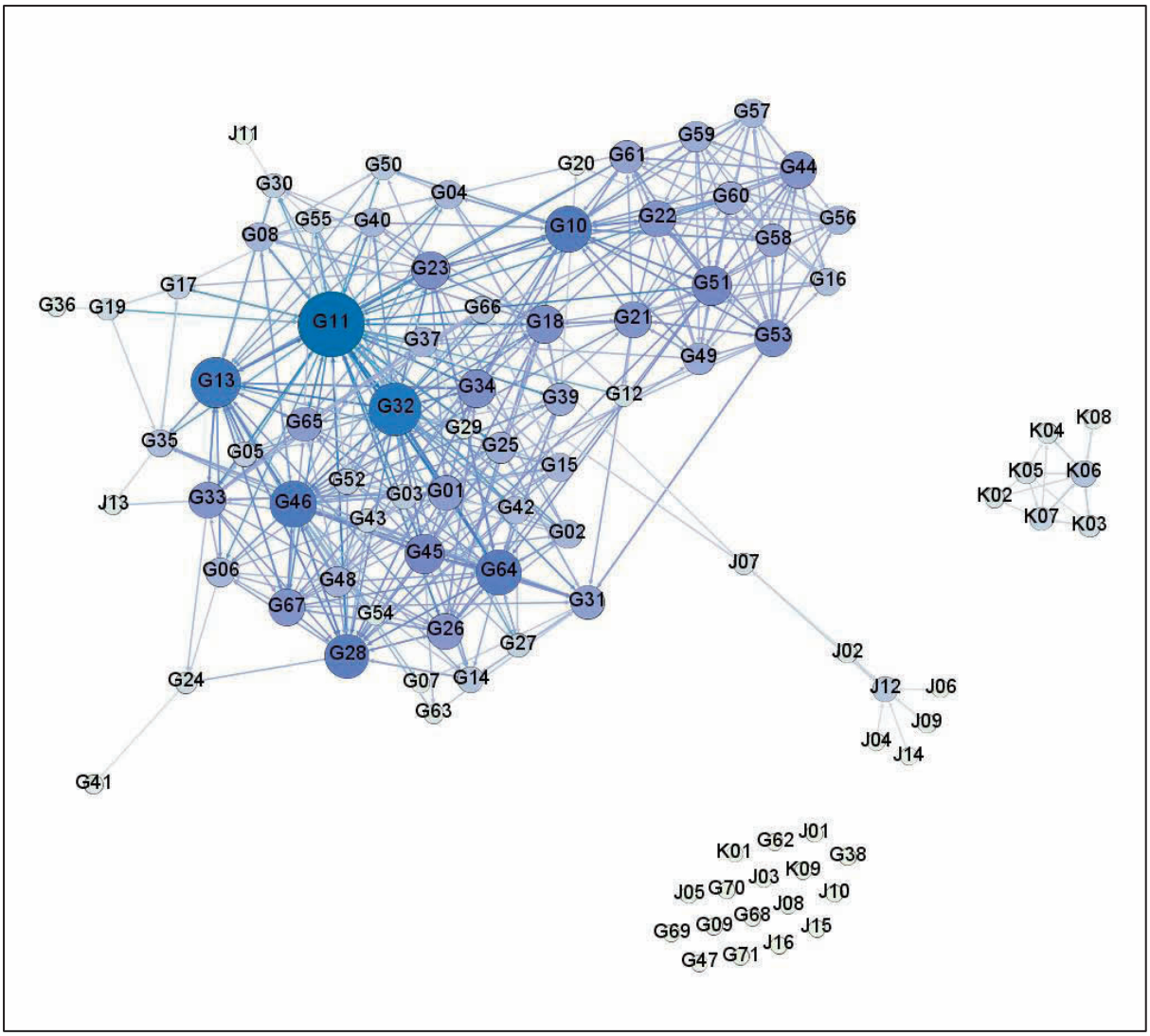

Figure 2. Combined networks of the NGOs in three countries (In-degree)

degree				closeness				between-ness	
out		in		out		in			
G11	0.295	G11	0.253	G11	0.237	G11	0.232	G11	0.126
G32	0.284	G13	0.211	G32	0.236	G28	0.228	G13	0.05
G46	0.211	G10	0.2	G48	0.231	G13	0.227	G33	0.043
G45	0.189	G28	0.2	G45	0.228	G37	0.227	J07	0.042
G21	0.168	G64	0.147	G46	0.227	G65	0.223	G10	0.038

Table 2. Centrality top 5 actors (Combined networks of the NGOs in three countries)

This chapter figures out the entire network by combining NGOs of Germany, Japan, and South Korea into one network.

Firstly, from the aspect of the whole network, there are 96 nodes in this network, and 79 nodes have a connection with at least one association. The network consists of two cliques without the 17 isolated nodes. One clique includes most of the connected nodes which are organizations in Germany and Japan, and the clique with German and Japanese nodes is mainly composed of three clusters that two clusters consist of the German NGOs mostly and the other is a Japanese one. The other clique is composed of nodes which are

South Korean NGOs. One organization connects with about five nodes on average, more than half of the connected nodes are interconnected. Also, more than 36% of all the connections are mutual.

An interesting part of this network from the perspective of individual nodes is that three of Japanese NGOs are connected to the network of the German NGOs. The identity of three nodes is J07[2] "Institute for Sustainable Energy Policies", J11 "Keio University" and J13 "Mie University". Among the three nodes, J07 is "structural hole (Burt, 2004)" who can have complementary sources to information that play a role as a broker between Japanese cluster and German cluster. In this network, J07 is ENGO[3] cooperated with CAN which is a global network of environmental NGOs, it connects to G37, ENGO whose name is "International Solar Energy Society e.V.", and G66, BINGO named "World Wind Energy Association". Other two organizations are not connected with the network of Japanese NGOs, but they connect only with the German NGOs. Also, German NGOs which relate to these two Japanese RINGOs are also RINGOs.

The network of NGOs in Korea is independent. They only have a relationship with each other in the Twitter network, but not with organizations of Germany and Japan.

(2) The network in Germany

degree				closeness				between-ness	
out		in		out		in			
G11	0.400	G11	0.343	G11	0.452	G11	0.395	G11	0.188
G32	0.386	G13	0.286	G32	0.449	G28	0.380	G13	0.069
G46	0.286	G10	0.271	G48	0.417	G13	0.376	G10	0.062
G45	0.257	G28	0.271	G23	0.407	G10	0.361	G28	0.056
G21	0.229	G64	0.200	G45	0.407	G34	0.359	G32	0.052

Table 3. Centrality top 5 actors (Germany)

The size of NGOs in Germany is not only the largest of the three countries but also the third largest in the world among the countries which participated in COP21. Also, in contrast with Japan and Korea, German NGOs also show a comparatively high rate of utilizing social media (71 out of 125 organizations). As well, NGOs which use social media are also making efforts to build networks in social media.

As described earlier, the network of NGOs in Germany consists of two loose clusters and only eight isolated nodes. It is the fact that some nodes like G11, G32, and G46 have a great influence on this network, but most of the nodes are connected diversely.

The node G11, which is a key player in this network, named "Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ) (German Corporation for International Cooperation GmbH)" is participating in the UNFCCC as ENGO. Its activities, however, are not limited to climate change issues, but a variety of areas with a philosophy of pursuit of public benefit. GIZ(G11) is a specialized intermediary organization that conducts consulting and management intermediate the governments, the corporations and the civil society. On the network, G11 is consulting with 28 nodes mainly research groups. Other organizations that have high degree-centrality are mainly focused on environmental issues as well in the UNFCCC, but also, they are organizations that operate through cooperation with the governments, the corporations, and the civil society.

[2] The information of nodes is shown in the Appendix.

[3] The nine constituencies, which UNFCCC process admitted, are: Business and industry NGOs (BINGO), Environmental NGOs (ENGO), Farmers, Indigenous people's organizations (IPO), Local government and municipal authorities (LGMA), Research and independent NGOs (RINGO), Trade union NGOs (TUNGO), Women and Gender Constituency (WGC), and Youth NGOs (YOUNGO). The number of organizations in the three contingencies that are ENGO, RINGO and BINGO./ Statistics on observer organizations in the UNFCCC process (n.d.). Retrieved from https://unfccc.int/parties_and_observers/observer_organizations/items/9545txt.php

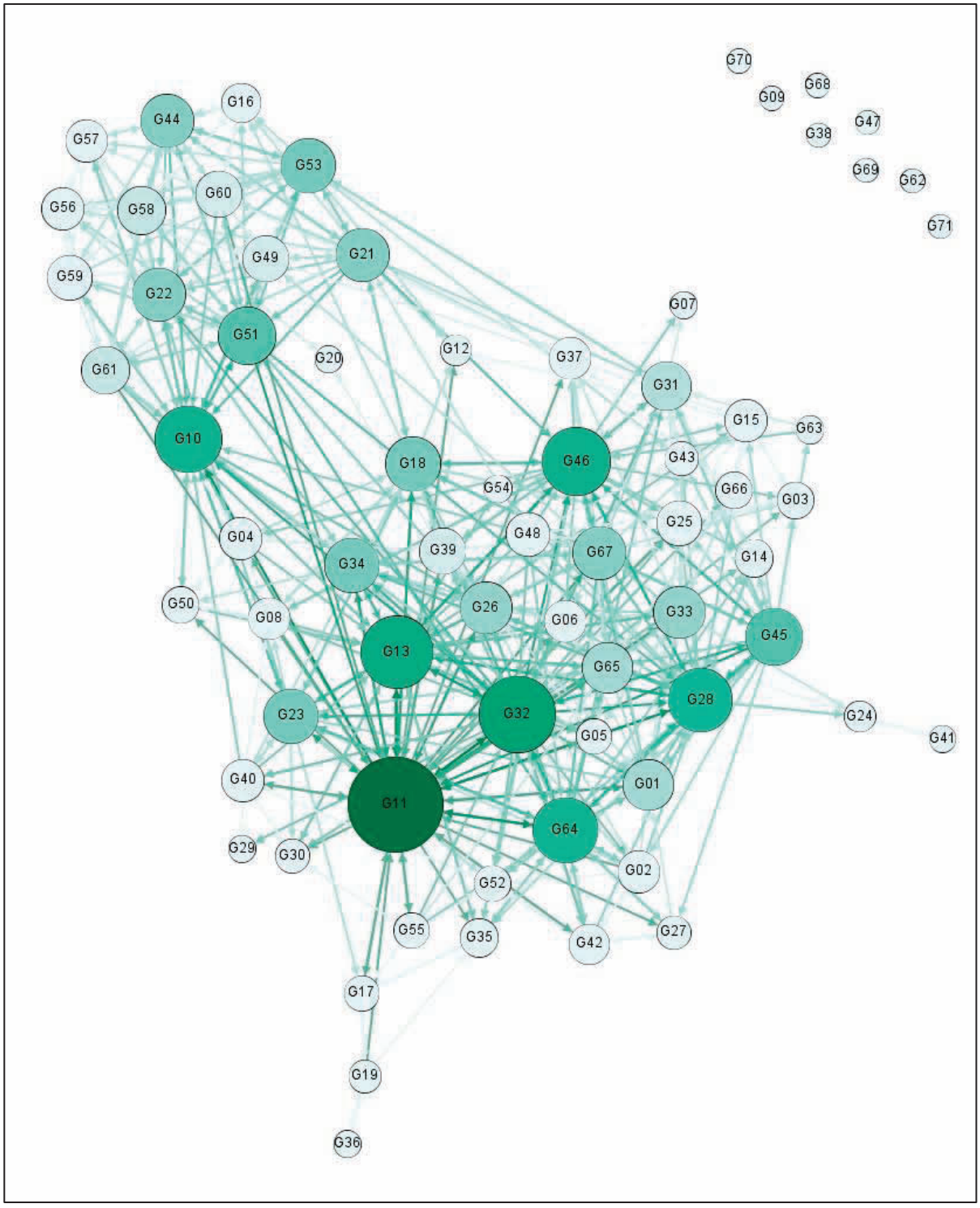

Figure 3. Networks of the NGOs in Germany (In-degree)

(3) The network in Japan

The big features of the NGO network in Japan are that the ratio of isolated nodes is very high, and the structure of the network is the shape of "star (Bogartti & Everett, 2000)" by unipolar tendency with node J12 "Kiko Network" (ENGO) which affiliates with CAN.

Also, the percentage of NGOs using social media is very low compared to the number of organizations participating in COP21, as well as, even if an NGO uses social media, the number of organizations that build networks is very small. That has something in common with Foljanty-Jost's point that weaknesses in Japanese civil society, such as lack of resources, closure and lack of solidarity (Foljanty-Jost, 2005). Also,

the number of NGOs participated in COP21 is about more than three times of the number of organizations in Korea, but the online network is similar to or smaller than South Korea.

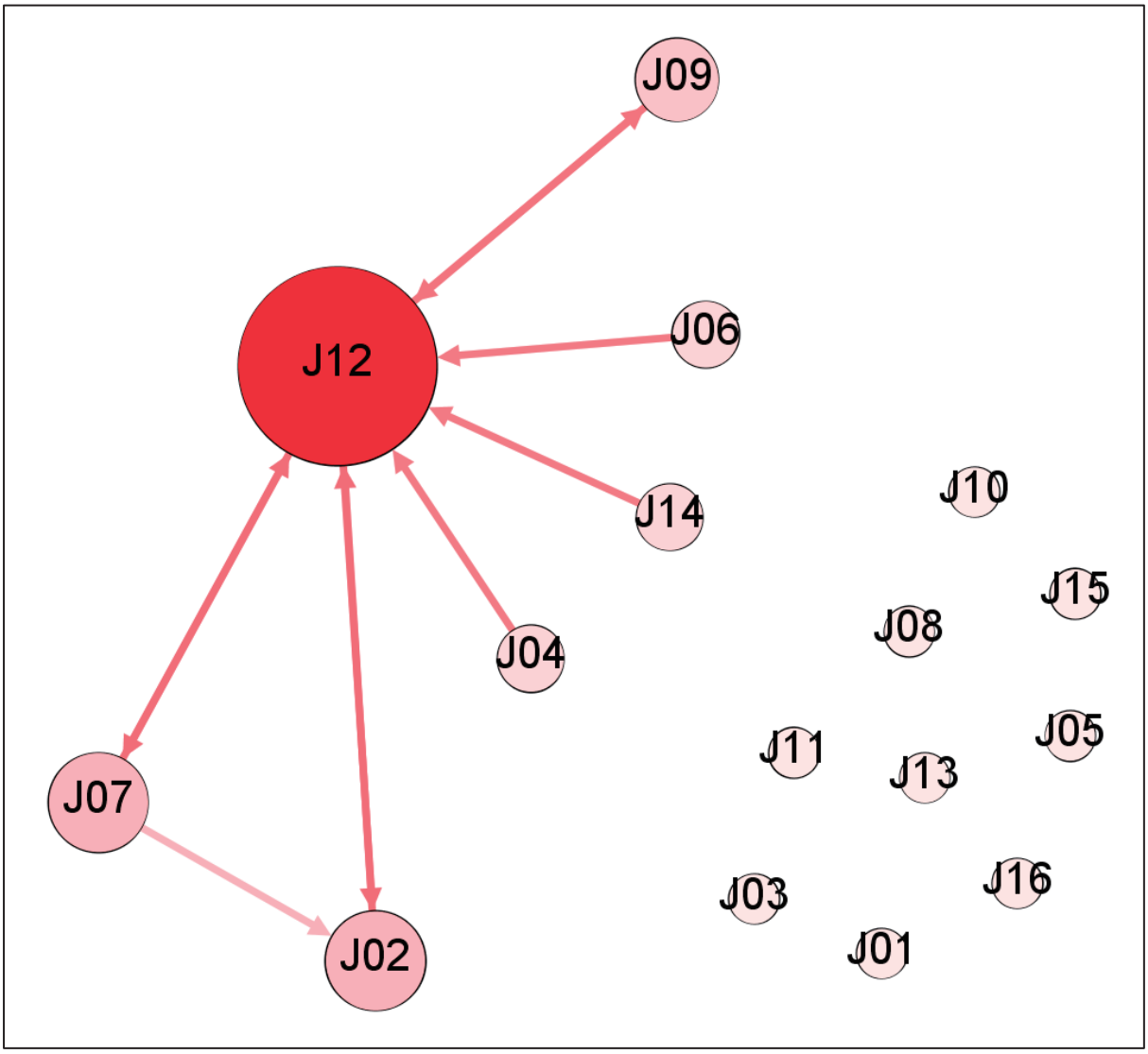

Figure 4. Networks of the NGOs in Japan (In-degree)

degree				closeness				between-ness	
out		in		out		in			
J12	0.200	J12	0.400	J12	0.385	J12	0.455	J12	0.067
J07	0.133	J02	0.133	J07	0.375	J02	0.405		
J02	0.067	J07	0.067	J04	0.375	J07	0.395		
J04	0.067	J09	0.067	J06	0.375	J09	0.395		
J06	0.067			J14	0.375	J04	0.333		

Table 4. Centrality top 5 actors (Japan)

(4) The network in South Korea

First, one of the important features of the network on NGOs in South Korea is small size and lacks diversity. The comprehensive contingency of the NGOs in Korea is ENGO, while there are NGOs in the German network have eight contingencies and three in Japan. This is reflected in the fact that the contingencies of the organizations participating in COP21 did not vary widely.

Nevertheless, in consideration of the small number of organizations participating COP21, the online network is comparatively not bad. Regarding the average number of connections and high ranked nodes in the out-degree measure, every single node has two connections and not too centralized even though K06 is a powerful actor in the network. It is behind the network of German NGOs, but regarding the diversity of information, flow is insignificantly better than Japan which has three more participants in COP21 than South Korea.

However, the networks in Japan and Germany have inter-network connections each other, contrarily, Korean network has no connection with foreign organizations. The isolated clique is a weak point to the network in Korea.

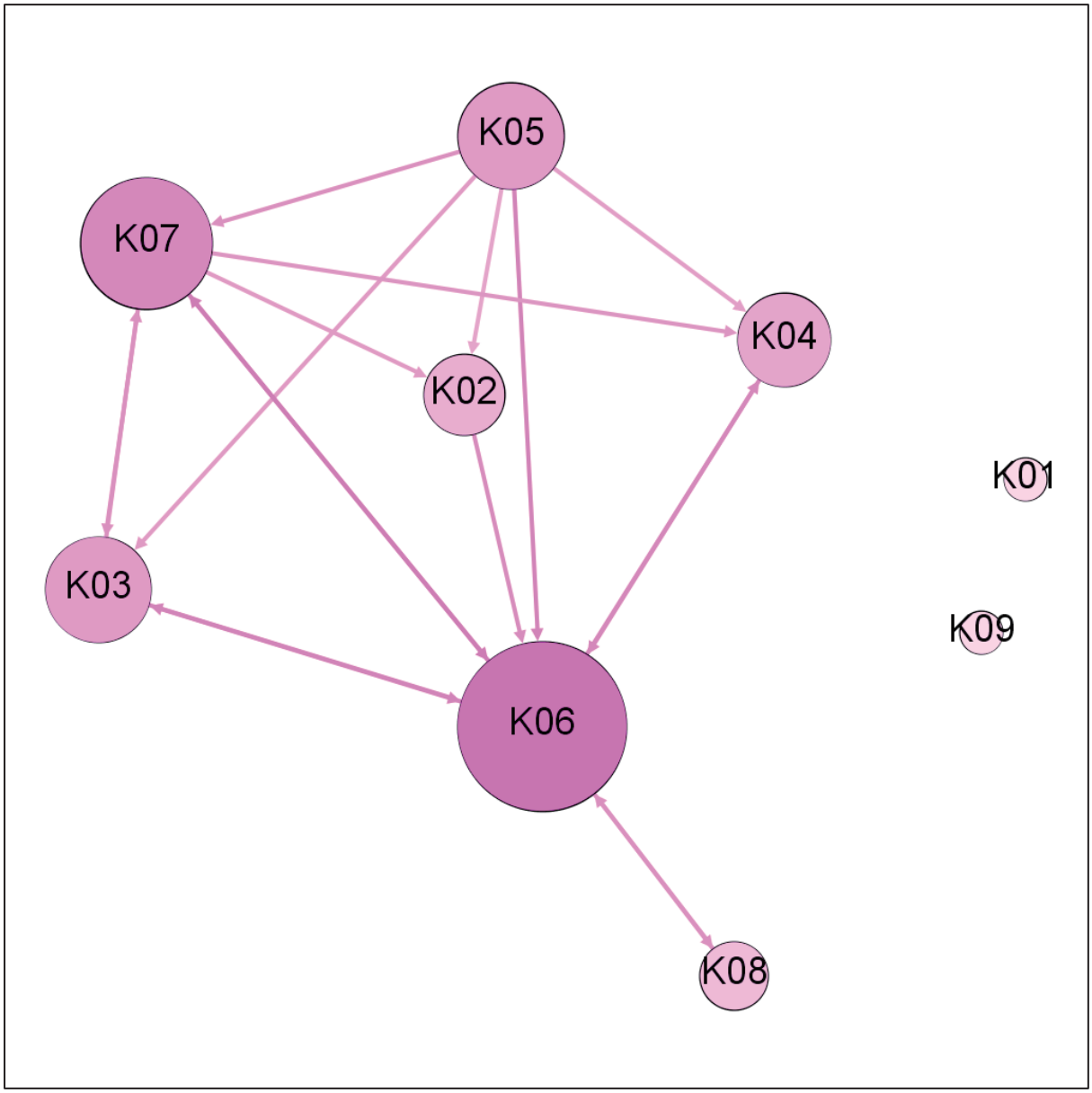

Figure 5. Networks of the NGOs in Korea (In-degree)

degree				closeness				between-ness	
out		in		out		in			
K05	0.625	K06	0.75	K05	0.533	K06	0.571	K06	0.277
K06	0.5	K07	0.375	K06	0.444	K07	0.471	K07	0.08
K07	0.5	K03	0.375	K07	0.444	K03	0.471		
K03	0.25	K04	0.375	K03	0.4	K04	0.471		
K02	0.125	K02	0.25	K02	0.381	K08	0.421		

Table 5. Centrality top 5 actors (South Korea)

4. Findings and limitations

(1) Findings

In this study, comparative analysis is conducted to identify the online network structure of NGOs Germany, Japan, and South Korea who participated in COP21 using social network analysis contrary to previous researchers that focused on case studies or regime itself.

As a result, some findings can be summarized as follows. In the network of NGOs in Germany of the online level, networking is much more active than Japan and South Korea. It is not from a large number of nodes due to the large number of organizations who participated in COP21, but the connections among the organizations in the network are more tight and closer than the networks of Japan and South Korea. It shows that the online network of German NGOs is stronger than Japan or South Korea. What is interesting is that between the networks of Germany and the network of Japanese, the two networks are interconnected by connection of few organizations. These organizations are acting as a "weak tie (Granovetter, 1973)" and a "structure hole. (Burt, 2004)" In Japan, on the other hand, only a very small number of organizations were connected to the online network. The number of NGOs which participated to COP21 is not small. It is about more than three times of the number of organizations in Korea, but the online network is similar or smaller than South Korea. The biggest difference between the two networks in Japan and South Korea is the structure of network involved power. Accordance with the results, the network in Japan more centralized the power. In contrast, the structure of the network in South Korea is dispersed and less centralized to one node.

(2) Limitations

To facilitate comparison between the target networks, the size of each network is made different. That makes the comparison analysis between the networks obviously clear, meanwhile the setting the difference of each network size makes slightly difficult to compare Japan and South Korea with Germany, because the network size of Japan and South Korea is relatively too smaller than Germany. In addition, by analyzing the Twitter network, it was possible to analyze the online network which is low barrier to entry. However, Time-specific data is not provided from the Twitter API, so follow network could not be analyzed by time.

To more accurately verify the inter-influence between participating the international environmental regimes and their own networks, Next researches will need to include the full network of NGOs in COP as well as networks with non-NGOs. At last, a more rigorous research design is needed to assess the influence of regimes and networks each other.

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Identifying the "Fukushima Effect":

Assessing Japanese Mass Media Coverage of International Nuclear Power Decisions[1]

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Leslie TKACH-KAWASAKI
Yohei KOBASHI

In the aftermath of the nuclear crisis involving the Fukushima Dai'ichi nuclear power plant on March 11, 2011, nuclear power generation in Japan and other countries has come under close public scrutiny. Immediately following the nuclear crisis, countries such as Switzerland and Germany that have relied historically on nuclear power utilization started to seriously reconsider safety measures surrounding nuclear power generation. Such considerations led to the June 2011 decision in the German Bundestag that went into force on August 6, 2011.

In the process of determining its own domestic nuclear energy policy, assessments and evaluations of other countries' responses in the aftermath of "3.11" have appeared frequently in Japan's domestic mass media. Yet have the nuclear energy policies in certain other countries such as Germany been singled out for comparison with Japan's own energy strategies and priorities? Furthermore, has such coverage tended to focus on the positive or negative aspects of nuclear energy?

In this paper, we assess the characteristics of Japanese mass media coverage of public opinion concerning nuclear energy policy in other countries. From a methodological perspective, our research draws on a combination of content analysis and sentiment analysis and investigates how the German case appeared in news articles concerning nuclear power in Japan in the six-month period from March 11 to September 11, 2011, identifies the main policy actors involved, and assesses if the coverage was positive or negative.

Keywords: Nuclear Energy Policy, Content Analysis, International Policy Comparisons, Japanese Journalism, Grounded Theory, Framing Theory, Narrative Theory

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Introduction

In the aftermath of the nuclear crisis involving the Fukushima Dai'ichi nuclear power plant on March 11, 2011, nuclear power generation in Japan and other countries has come under close public scrutiny. Immediately following the nuclear crisis, countries such as Switzerland and Germany that have relied historically on nuclear power utilization started to seriously reconsider safety measures surrounding nuclear power generation. Such considerations led to the June 2011 decision in the German *Bundestag* that went into force on August 6, 2011. Germany is internationally known to be at the forefront in tackling environment and energy policy issues on a national scale under wide political and social consensus.

Germany's coalition government of the Social Democratic Party (SPD) and the Green Party (Bündnis 90/Die Grünen) between 1998 and 2005 already pursued nuclear phase-out and formulated its legislative framework into their political agenda. Only a few months before the Great East Japan Earthquake, which damaged the nuclear reactor of the Fukushima Dai'ichi power plant run by the Tokyo Electric Power Company (TEPCO) and caused the most serious nuclear disaster since the Chernobyl accident in 1986, the

[1] This paper was originally published as a Research Note in the *Journal of International and Advanced Japanese Studies*, 8, 109-124, February 2016.

new government coalition formed after the 2009 general elections of the Christian/Social-Democratic Union Party (CDU/CSU) and Free- Liberal Party (FDP) postponed nuclear phase-out under major pressure from nuclear-energy-generating electricity companies in Germany. But the crisis involving the nuclear power plant on March 11, 2011 immediately spurred the reintroduction of a nuclear phase-out platform which was eventually labeled as the "phase-out of the phase-out" (Schreurs, 2012).

In the process of determining its own domestic nuclear energy policy, assessments and evaluations of other countries' responses in the aftermath of "3.11"[2] have appeared frequently in Japan's domestic mass media. Yet have the nuclear energy policies in other countries been singled out for comparison with Japan's own energy strategies and priorities? Furthermore, has such coverage tended to focus on the positive or negative aspects of nuclear energy? Arlt and Wolling (2015: 3) have identified the "Fukushima Effect," using this phrase to describe "international findings on attitude changes towards nuclear power as a result of the Fukushima accident." However, their results show only a moderate impact of this incident in terms of attitudes towards nuclear energy based on an analysis of German mass media coverage and survey data. In consideration of Germany's reaction on a wide political scale, we assess the characteristics of Japanese mass media coverage of public opinion concerning nuclear energy policy in Germany. We are specifically interested in assessing how Germany's sudden energy shift as a reaction to the Fukushima incident was perceived through four major Japanese newspapers (the *Asahi*, the *Mainichi*, the *Nikkei*, and the *Yomiuri*). From a methodological perspective, our research draws on a combination of content analysis and sentiment analysis, and investigates the discourse involving Germany, drawing on news articles concerning nuclear power in Japan in the six-month period from March 11 to September 11, 2011, identifies the main policy actors involved, and assesses if the coverage was positive or negative.

The first section provides an overview of Japan's legal framework regarding nuclear energy policy and the historical background of nuclear energy in Japan, followed by a review of the literature covering the aspects of nuclear energy determinants in Japan and characteristics of the Fukushima news coverage. Then, we discuss briefly the theoretical framework and methodology that we draw on to explain our results. As our research involves qualitative content analysis, framing theory, with its focus on analyzing in-depth issues or events, serves our aim to combine content analysis and sentiment analysis of text data. We combine this theoretical approach with constructivist grounded theory to reveal crucial issues in the research questions by coding the data interactively instead of using predetermined parameters. We suggest that this combination of framing as a traditional approach and grounded theory with a new approach in computer-assisted text analysis can allow us to uncover new patterns in investigating news coverage and provides a potential solution to the critical role the researcher takes within his/her own research in grounded theory. In section five, we discuss our main results, wherein we examine the articles in each newspaper individually, and close with a brief comparison of the characteristics in the news coverage of the German case in the four newspapers, where we summarize our main findings and evaluate our methodology for further research.

1. Nuclear energy discourses in Germany and Japan

Since the 1960s, anti-nuclear energy issues have been part of the political agenda in Germany. The establishment of the Green Party (*Bündnis 90/Die Grünen*) in 1980 and its election to the German *Bundestag* in 1983 defined the path for strong environmental/anti-nuclear energy policy discourse. Different than in Japan where the Ministry of Economy, Trade and Industry (METI) is in charge of nuclear-energy regulations, Germany's nuclear-energy policy is regulated by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMUB), established in 1986 (Schreurs 2002). The red-green coalition between the Social Democratic Party (SPD) and the Union 90/The Greens (Bündnis 90/Die Grünen) under former chancellor Gerhard Schröder (SPD) between 1998 and 2005 set the foundation for nuclear phase-out. With the 13th change of the Atomic Act (January 1, 1960) on July 31, 2011, as a direct response to the Fukushima accident, the governmental coalition of the CDU/CSU and the FDP returned to a policy of phasing out nuclear energy by 2022. Even though the effect on domestic energy policy decisions after Fukushima eventually led to consensus between the ruling and the opposition parties, the Chernobyl catastrophe in 1986 in the Ukraine, a close neighbor, had a lasting influence on Germany's anti-nuclear policy path. This background of political attention to nuclear issues made the characteristic reaction on the

[2] The phrase "3.11" (pronounced "three-eleven") is frequently used by the Japanese people to refer to the triple disasters that occurred on March 11, 2011 involving the Great East Japan Earthquake, the resulting tsunami, and the nuclear accident at the Fukushima Dai'ichi nuclear power plant.

Fukushima disaster on public and policy discourses in Germany possible (Seiffert & Fähnrich 2014).

The origins of Japan's anti-nuclear movement dates back to the 1950s. The first incident involved the Lucky Dragon No. 5 (Daigo fukuryu¯ maru), wherein a Japanese fishing boat was exposed to and contaminated by nuclear fallout from the U.S. Army's hydrogen bomb testing in March 1954. This incident was the initial catalyst for future anti-nuclear movements in Japan. During the 1970s and 1980s, other incidents occurred such as the Mutsu radiation leak accident in 1974, which drew limited attention to the nuclear power debate. From the late 1970s and into the early 1980s, as a result of political and social factors, administrative reforms related to nuclear energy were carried out, and the building of new nuclear power plants was not permitted during this period (Honda, 2005).

However, anti-nuclear social movements faced a difficult situation after the 1980s. Labor unions that had supported these movements were shrinking as a result of reorganization of the labor market. The Cold War ended and the prestige of Marxism was gradually decreasing. As a result of these global and political changes, social movements gradually lost material resources and ideological status. In the summer of 1994, the Social Democratic Party of Japan (SDP) changed its nuclear energy strategy and accepted the use of nuclear power plants in order to join the coalition government with the Liberal Democratic Party of Japan (LDP) and the New Party Sakigake. At the same time, information regarding many nuclear accidents and scandals surfaced, and social movements were activated especially at the local level. Isolated nuclear incidents continued to occur, for example, the Tokaimura nuclear accident at a JCO[3] plant in September 1999, which was estimated to have reached "level four" on the International Nuclear Event Scale (INES) (Kawana, 2013: 276). In response, the Act on Special Measures Concerning Nuclear Emergency Preparedness was enacted in the same year.

After the Fukushima accident in March 2011, Japan's nuclear energy policies entered a complicated phase, however it seems that the disaster did not engender fundamental policy changes. In September 2012, Noda Yoshihiko, a DPJ (Democratic Party of Japan) politician and the former prime minister from September 2011 to December 2012, devised new energy and environmental strategies that included halting the operation of all nuclear power plants by the 2030s. Also, new regulatory standards were formulated in 2013, and nuclear safety regulations were strengthened substantially (Yamaguchi, 2013: 1, 8-9). However, Noda decided to restart the nuclear power plants which were sitting idly after the Fukushima Disaster in order to meet energy demand, and the Oi nuclear power plant located in Fukui prefecture was restarted in July 2012. Also, the Sendai nuclear power plant located in Kagoshima prefecture was restarted in August 2015, based on a decision made by prime minister Abe Shinzo.

Japan and Germany have been part of international environmental and anti-nuclear movements since the early post-war era and political responses towards environmental issues have prominently figured in news coverage. Even though Japan experienced nuclear accidents prior to Fukushima, even afterwards, anti-nuclear movements have struggled to encourage public discourse which could influence political decisions. Yet strong ties between the LDP-led government and economic ministries with industry contacts have dominated the discourse (Hartwig et al. 2014). In contrast, the energy industry in Germany has been active in promoting renewable/clean energies and favors nuclear phase-out, which, in turn, has been reflected in environmental/anti- nuclear public opinion in the mass media.

2. Literature Review

(1) Determinants of Japan's nuclear policies

There are numerous studies that focus on both domestic and international factors that determine nuclear policy in Japan. First, we focus on studies that point to domestic factors. Honda Hiroshi (2005, 2014) analyzed the political process of Japan's nuclear energy policy from the perspective of social movement theory. More specifically, he focused on not only the dominant political actors such as the bureaucracy, the ruling party and industrial associations, but also opposition parties, civic movements, labor unions and local governments that potentially have opportunities to change nuclear policy. The major results from his studies have been that (a) opposition parties and labor unions that have supported movements were split in half and this led to weakening the anti-nuclear movements by the 1980s; (b) pro-nuclear political actors that were supported by economic groups seized power after 1990s; and (c) many nuclear accidents garnered publicity

[3] Formerly the Japan Nuclear Fuel Conversion Co., which is now defunct. Source: World Nuclear Association (2013) Tokaimura Criticality Accident 1999 (http://www.world-nuclear.org/info/Safety-and-Security/Safety-of-Plants/Tokaimura-Criticality-Accident/) (Access date: September 20, 2015).

and social movements were activated especially at the local level (Honda, 2005). The Fukushima Dai'ichi incident promoted reactivation of pro-nuclear groups as well as anti-nuclear groups (Honda, 2014). The restart of the Oi and Sendai nuclear power plants suggests that Japan's nuclear policies have been determined by the attitudes of political elites[4].

On the other hand, there is also the question as to whether international factors, for example, the international system or international policy changes, have played a role in determining Japan's nuclear policies. Shibata and Tomokiyo (1999) argued that Japan's public opinion has tended to be more cautious about nuclear energy after major nuclear accidents such as the 1979 Three Mile Island accident and the 1986 Chernobyl disaster[5]. Sagara (2009) suggested that international policy changes and discussions have some impact on Japan's political decision-making regarding nuclear energy. Suzuki (2014) focused on import and export policies of nuclear technology and analyzed historical changes in the international system that promote the use of nuclear energy. As a result of her analysis, she claimed that there has been a major impact in decision-making processes by the U.S. government and its nuclear power industries, but the impact of the Soviet Union under the Cold War and China in the 21st century cannot be ignored as well. After the Fukushima Dai'ichi incident, there have been numerous publications that focus on nuclear and energy policy or energy security strategies in various countries from both pro-nuclear and anti-nuclear groups (Kawaguchi-Mahn, 2013; Kawaguchi, 2015). International factors are frequently specified through international organizations, treaties or international accidents, and may have had some impact on Japan's decision-making regarding nuclear policy.

(2) Characteristics of news coverage of 3.11 in Japan and Germany

Numerous studies about media, communication and journalism have pointed to the vital role that the mass media plays in shaping political discourse and public opinion in modern democratic countries such as Germany and Japan. Whereas the media landscape in Japan is considered to have a characteristically high influence on determining public opinion and political discourse (Takeshita & Takeuchi 1996), studies analyzing characteristics of Japanese and German mass media in the aftermath of the Fukushima incident provide a solid basis for our research. To address the question whether the effect of Fukushima on international energy and nuclear policy shows evidence of pressure through a reverse effect in changing its own domestic nuclear energy policies, it is necessary to summarize the most important findings about Fukushima news coverage in Japan and Germany.

Considering Germany to be a special case in regards to its domestic responses to Fukushima in terms of changing its nuclear-policy decisions, how did the German media report about Fukushima? In comparison to the Chernobyl news coverage, using a quantitative historical approach, Nienierza (2014) found that the general frames of both events in German news coverage are almost the same, yet a positive frame of nuclear energy existed after Chernobyl, whereas after Fukushima, no positive frame could be found. Wolling and Arlt (2014) explained that because the accident in 1986 happened in a technologically less-developed country, the effect of Fukushima was much more drastic, as Japan is a technologically advanced country and known for its safety measures. Similar to Nienierza, Seiffert and Fähnrich (2014) identified the same anti-nuclear energy frame after Chernobyl and Fukushima, and argued that the pre-existence of that negative frame was responsible in part for the "Fukushima effect," using a qualitative approach in analyzing German newspaper.

Hayashi (2013) showed that while Germany's main television broadcasts featured extensive news coverage about the Fukushima disaster, its emphasis was on Japan's political and social responses along with the effects on Germany itself. Moreover, about 40% of the Fukushima disaster news coverage was strongly connected to Germany's domestic political responses, which focused on opposition party and governmental opinion from the beginning, increasing from comprising approximately one-third to more than half of the main texts of major news broadcasts, suggesting that the Fukushima incident was being closely tied to domestic politics in Germany. Judging from those findings, Germany appears to be an anti-nuclear dominated society and its anti-nuclear political stance affects public opinion. Arlt and Wolling (2015: 3) identified the "Fukushima Effect," using this phrase to describe "international findings on attitude changes towards nuclear power as a result of the Fukushima accident" focusing on political and social responses, yet

[4] At the same time, we cannot argue that Japan's anti-nuclear movements have been necessarily weak. As Honda Hiroshi noted, anti-nuclear movements have some impact especially at the local level (2005, 2014).

[5] At the same time, when we focus on the policy level, the Chernobyl disaster has not lead to fundamental political change to Japan's nuclear policies (Wakao & Honda, 2012, Introduction).

showed only a moderate impact of Fukushima in terms of attitudes towards nuclear energy based on an analysis of German mass media coverage in combination with survey data.

Drawing from quantitative and qualitative content analyses as a common tool for media studies, Abe (2015) identified the general debate over nuclear energy after Fukushima in Japan as filling the void between simple anti- or pro-nuclear energy debates with more nuanced content by identifying in-depth debates about nuclear energy in newspaper editorials. Whereas the *Asahi* and *Mainichi* advocated denuclearization appealing to democratic values and criticizing undemocratic administration of nuclear energy, the *Sankei* and *Yomiuri* opposed it with technological nationalistic values arguing Japan needs nuclear energy to keep its economic- technological leading position in the international society. Abe identified that news attention in the context of nuclear energy in the aftermath of 3.11 in the *Yomiuri*, for example, focused on technological-nationalistic attitudes against nuclear phase-out, arguing that Japan's advanced technology was vital to ensure the safety of international nuclear management (Abe 2015: 100). In news items about the weekly anti-nuclear movements in front of the Prime Minister's residence in 2012, and movements against restarting the Oi and Sendai nuclear power plants, by using anti-nuclear keywords (*datsugenpatsu* or *hangenpatsu*), Yoshino (2013: 97) identified major differences between the *Asahi*, which covered five to ten times more news articles in a short one-month period, and the *Yomiuri*, which appeared to take a stance closer to that of the cabinet office and the ruling party DPJ in covering these issues.

While studies are focused around the implications of analyzing how the mass media in each country reacted in their respective social contexts through international comparison, there is a research gap in studies analyzing international news in Japan concerning Germany's energy policy shift after Fukushima. Our analysis shows that the news coverage about Germany's anti-nuclear energy policy in Japanese mass media reflects these general findings, but reveals certain characteristics.

3. Framing the narrative of the Fukushima effect

While catastrophic events such as earthquakes and tsunamis are not constructed, the extent to which the nuclear accident was man-made is not addressed here; rather, in order to understand how a natural disaster affecting societies is narratively constructed and framed in a media context to make it perceivable and how this influences society and politics, is a crucial aspect that needs to be addressed.

Nisbert and Newman (2015) define frames as "interpretive storylines" and suggest that defining themes influences the amount of attention an issue receives. Members of the public rely on frames to make sense of complex issues, and frames found in media coverage influence public opinion as they rely on what they refer to as mental models about a certain issue, which in turn define what frames people look at when reading through newspapers. Identification of frames by news covering nuclear energy policies and the reaction of nuclear- energy-generating countries is crucial when trying to find evidence whether nuclear energy policy decisions of other countries in the aftermath of Fukushima could shape Japan's public opinion on nuclear energy and eventually channel international pressure towards political decision-making processes.

Nuclear energy, environmental and climate issues are image-loaded topics and the meaning of such catastrophic events is constructed by societies and the "process of assigning meaning to an event essentially requires the discursive 'work' of claims-makers" (Hansen 2010). As natural disasters, earthquakes and tsunamis cannot be controlled thus cannot be avoided, but it is possible that nuclear power and energy policy can be determined to mitigate the effects of natural disasters in the future.

Based on Hansen (2010), considering the "constructed" nature of public communication we find in mass media, framing and narrative theory provides fundamentals to analyze and understand why certain issues are being recognized over others (2010: 34). Social problems are always subjective and become recognized as such only through communication which constructs them as being a problem for public and political concern (2010: 14). Analyzing the characteristics of information coverage by mass media over a specific issue and finding differences between newspapers, can be analyzed while drawing from the narrative theory approach, where the information regarding social relevant issues are put together into a frame according to framing theory and build a narrative (story) intended for a certain audience. As each newspaper has its main readership, the predefined opinion, in other words mental model as explained by Nisbert and Newman (2015), people have about a public issue, influence their choice which information provided by different newspaper to follow.

After the Fukushima incident, Germany turned back to its recently abolished anti-nuclear energy policy. In the following section, we investigate how the influence of this event on Germany's cause of action appeared in Japanese mass media and whether Germany's political changes show the potential to influence Japan's decision making regarding its nuclear energy policy, an effect we would label the "reverse

Fukushima Effect".

5. Utilizing a mixed methods approach to analyze news coverage of German nuclear energy policy in Japanese mass media in the aftermath of 3.11

(1) Sampling the text data

Since the environmental movements of the 1960s, mass media has become a crucial actor in influencing political decision-making processes in environment-related topics based on how the environment and environment-related issues are presented to and perceived by the public (Hansen, 2010). Mass media can be considered as a central channel through which information about other countries reach society and, in the context of this research, whether the "Fukushima Effect" eventually had a reverse impact. In this paper, we assess how Germany's sudden shift in its energy policy to become nuclear free by 2022 as a reaction to the Fukushima incident was perceived through four major Japanese newspapers: The *Asahi* (circulation of 6.8 million for the morning edition and 2.2 million for the evening edition) and *Mainichi* (circulation of 3.2 million for the morning edition and 939,000 for the evening edition), known to take an anti-nuclear energy/pro- denuclearization stand, and the *Nikkei* (circulation of 2.7 million for the morning edition and 1.4 million for the evening edition) and *Yomiuri* (circulation of 9.1 million for the morning edition and 2.9 million for the evening edition)[6], known to be in favor of upholding nuclear energy technologies in order to ensure Japan's international leading economic-technological role (cf. e.g. Abe 2015, Yoshino 2013). From a methodological perspective, our research draws on a combination of content analysis and sentiment analysis, and investigates on the one hand how often news articles concerning nuclear power in Japan referred to the German case in the six-months period from March 11 to September 11, 2011, and, on the other hand, identifies the main policy actors involved and assesses if the coverage was positive or negative.

As preparation for the content analysis, we investigated the databases of the four newspapers with a set of keywords consisting of "nuclear energy" (*genshiryoku*) and "political measures" (*seisaku*) together with country names based on the list of nuclear energy generating countries provided by the World Nuclear Association[7] to get an overview how international nuclear energy policies appear in Japanese mass media. Our main interest was to investigate how Germany's energy policy in the aftermath of 3.11 was perceived through Japanese mass media, and thus, we narrowed our results down and focused our attention for the content analysis on articles where Germany was mentioned. We chose the time period of March 11 to September 11, 2011 as it covers the immediate aftermath of the Fukushima Dai'ichi nuclear plant accident as well as the time frame leading up to the June 2011 legislation to phase-out nuclear power in Germany.

(2) Qualitative analysis of text data

Methodological advice from Charmaz's (2012) Constructing Grounded Theory, drawing from methods based on the grounded theory approach of constructivists on how to analyze a great amount of text data, provides us with a heuristically appropriate tool to handle our sampled data in a short period of time. It is important to note that we are not building on a theoretical construct and applying it to the data. Rather, we draw from communication studies' framing and narrative theory to explain the results from our coded data, which will be explained in the following section.

Coding text data in fragments, certain words, lines or segments, to identify the sentiment laying in news coverage of the "Fukushima Effect" on an international scale allows us to focus our attention on certain issues emerging from the data, identifying the frame and narrative constructed by the newspaper and providing us with the possibilities of raising analytical questions. Furthermore, we also considered the possibility of finding evidence of international pressure (*gaiatsu*), which we later call the "reverse Fukushima Effect" channeled through mass media. The critically assessed subjectivity regarding this method and the problems of assumption-generation on text-data in order to identify latent traits and evaluate their "usefulness" in measuring their "real quantities", our method is validated through the findings by Lowe and Benoit (2013), who validated human judgment as a benchmark for qualitative content analysis of political text-data, in terms of "semantic validity" and that the quantity being scaled from qualitative and sentiment text analyses reflects the quantity that was intended to be measured. While using tools within the analytical program NVivo 10, designed for qualitative research, we performed a sentiment analysis through an attribute

[6] Reference for newspaper circulation numbers: http://www.kokusyo.jp/wp-content/uploads/2015/10/MDK151006b.pdf (access date: 2015/11/30).

[7] http://www.world-nuclear.org/info/Facts-and-Figures/Nuclear-generation-by-country/ (access date: 2015/09/17).

value matrix query based on our coded content. For this, it was necessary to define attribute values to the data. These attribute values basically consist of elements of a coding sheet for newspaper content analysis.

5. Results: Evidence of a "reverse Fukushima Effect"?

(1) General findings

Table 1 shows the results of performing newspaper article database searches using the methodology described in the previous section. In terms of the number of articles overall, three out of the four newspapers published over 1,000 articles each during the six-month time period that was reviewed. Among the three, the figures for the *Asahi* and the *Yomiuri* newspapers are the highest. In all four newspapers, the percentage of articles covering Germany in the context of nuclear energy policy was less than 10%, with the *Asahi* having the highest percentage of 8.3% (n=1124) and the *Yomiuri* having the lowest percentage of 4.6% (n=1116), while the *Yomiuri* has the fewest number of articles (n=941) followed by the *Nikkei* (n=1005). Among all four newspapers, there were few articles that focused on Germany in the context of nuclear energy policy. The next four sections describe the article contents, which focused on nuclear energy policy in Germany in more detail for each of the four newspapers. Considering the prescribed standpoints towards nuclear energy for these major newspapers, the leading role of the *Asahi* in comparison with the *Yomiuri* at the bottom, represents the general findings of previous studies. The analysis will show, that the nuclear energy technology favoring *Nikkei* with a higher rate of 7.3% (n=73) in comparison with the pro-denuclearization favoring *Mainichi* with a rate of 4.9% (n=46), draws from the institutionalized anti-nuclear policy of the Green Party in Germany negatively to promote its pro-nuclear energy technology path for Japan, what affirms Abe's findings (2014) about the *Nikkei* to promote positive aspects of nuclear energy for the wealth and stability of Japan.

Table 1 Number of articles in the context of nuclear energy policy and Germany between March 11 and September 11, 2011

Newspaper	Articles covering nuclear energy policy (N)	Articles covering Germany in the context of nuclear energy policy (N, %)	Articles with Germany as main theme in the context of nuclear energy policy (N, %)
Asahi	1124	93 (8.3%)	22 (2.0%)
Mainichi	941	46 (4.9%)	7 (0.7%)
Nikkei	1005	73 (7.3%)	18 (1.8%)
Yomiuri	1116	51 (4.6%)	5 (0.0%)

(2) Asahi: Reluctantly positive

Germany, along with France and the U.S. figured prominently in political reactions to the Fukushima disaster as a matter of interest in the *Asahi*'s news coverage when it assessed changes in international nuclear energy policies (or the lack thereof) in the aftermath of 3.11. During the six-month period, we found a total of 1,124 articles in the Kikuzo II Visual database (the *Asahi* newspaper company's database) referring to the issue of nuclear energy and political measures. Slightly less than one-quarter (241 articles out of 1,124) referred to nuclear energy in the context of political measures and nuclear energy generating countries. In 93 articles, Germany's situation was mentioned, while 22 articles referred to Germany in the context of nuclear energy policy as their main theme. The highest numbers of articles compared to the other three newspapers as shown in the following sections.

Table 2 Attitude towards nuclear phase-out in the context of Germany's nuclear energy policy shift: *Asahi*

Section	Nuclear phase-out positive (percentage of articles)	Nuclear phase-out negative (percentage of articles)	Nuclear phase-out neutral (percentage of articles)
Opinion/Commentary	100.0%	0.0%	0.0%
International	15.9%	34.6%	49.5%
Economy/Finance	0.0%	0.0%	0.0%
Politics	16.5%	49.1%	34.4%
Society/Culture	0.0%	0.0%	0.0%
Local	4.1%	0.0%	96.0%

Table 2 summarizes the attitudes towards nuclear phase-out in the context of Germany's shift in nuclear energy policy and how the general view on that topic differs in the *Asahi* newspaper in comparison to each newspaper's section. In terms of comparability, we labeled the sections for all four newspapers with these terms, as the section titles between the newspapers differ. Showing only a small rate of positive agreement towards Germany's political decision to abandon nuclear energy completely as an electricity-supplying source of energy by 2022, it is still the highest rate among the four newspapers. The standpoints between negative and neutral towards Germany's political change after Fukushima is somewhat balanced in the major sections. This is also evident where the *Asahi* has a rather balanced coverage between the German ruling party (CDU/CSU) and the major opposition party (SPD).

While the *Asahi* implemented expressions describing the legal implementation of the nuclear phase-out citing German media, which reflects a rather positive attitude, the narrative of describing the "Fukushima Effect" on Germany is reluctantly positive on the one hand, but presenting a rather critical view on the question as to whether Japan should pursue a similar path. Major themes such as changes in energy policy and the narrative of Germany's uniqueness in terms of legal fundamentals provided by both the European Union as well as domestic politics with the emergence of the Green party in 1980 and the effect of the Chernobyl incident of 1986 on political and social attitudes towards nuclear energy are prominent. These are experiences that pertain only to the German situation as explained in section 1. The question arose whether these fundamental differences, and the attention by the international society towards Japan during the Fukushima crisis can eventually channel pressure to promote political and social change.

Social responsibility and a strong civil society, a long history of persuasive environmental movements in Europe[8] in contrast to Japan's weak civil society as assessed by the *Asahi* are emphasized when discussing the existing fundamentals for successful political change in Germany. Technological capabilities to increase the electricity imports as a substitute for electricity supplied by nuclear energy reactors from its neighboring countries are seen as a further advantage[9]. Thus, even though Japan's responsibility to consider the same path as Germany is part of the discussion, the cognitive distance put between them prevents direct pressure on politics and society in Japan to supersede Germany in the role of forerunner in energy policy matters, noting Fukushima as a chance for change. With 54 nuclear reactors, Japan faces a greater challenge of being able to provide substitutes for nuclear energy as its main energy source compared to Germany, which is considered to be more likely capable of succeed with its energy shift, having only 17 nuclear reactors to substitute with other energy sources and a strong legal framework for renewable energy sources along with consensus between the public and the government. In this context, the wide gap between public opinion and the government in Japan as a key aspect was supported by a survey conducted by the *Asahi* among seven major nuclear countries (Japan, US, France, Russia, Korea, Germany and China) aiming at assessing attitudes towards nuclear energy and its further use after Fukushima[10]. According to this poll, 73% of the Japanese public was against the further use of nuclear power. However, consideration of Germany's historically deep anti-nuclear "green" ideology in terms of environment and energy policies, as well as the major role of the German government under Chancellor Merkel (CDU) in strong cooperation with the BMUB during the respective time period, provides the ground for successful implementation of a new legal framework, which led ultimately to nuclear phase-out. The actual "reverse Fukushima Effect" by Germany's

[8] E.g. Asahi, March 16, 2011.
[9] E.g. Asahi, June 7, 2011.
[10] Published on May 27, 2011.

sudden shift in energy policy, is limited to longitudinal economic effects, which was hardly mentioned in the *Asahi* but plays a much greater role in the *Mainichi* newspaper.

(3) Mainichi: A hollow frame

For the investigation of the *Mainichi*, we used the Maisaku Mainichi database provided by the Mainichi newspaper company. In a total of 941 articles in the context of nuclear energy policy measures, there were 178 articles focusing on international news coverage of nuclear-energy-generating countries and nuclear-energy policy measures in the context of 3.11. Roughly one-quarter (46 of 178 articles) mentioned Germany, but only 7 articles featured Germany as a main theme. The possibility of a "reverse Fukushima Effect" can considered negligible assessing the quantity of the news coverage regarding Germany's energy policy decisions. However, in regard to how previous study positioned the *Mainichi* in the overall nuclear energy debate in Japan together with the *Asahi* as pro-denuclearization, the results were unanticipated.

Table 3 Attitude towards nuclear phase-out in the context of Germany's nuclear energy policy shift: *Mainichi*

Section	Nuclear phase-out positive (percentage of articles)	Nuclear phase-out negative (percentage of articles)	Nuclear phase-out neutral (percentage of articles)
Opinion/Commentary	0.0%	100%	0.0%
International	0.0%	39.3%	60,74%
Economy/Finance	0.0%	100.0%	0.0%
Politics	0.0%	52.7%	47.3%
Society/Culture	0.0%	0.0%	100.0%
Local	0.0%	0.0%	100.0%

The articles in the *Mainichi* appear to have taken a political economic standpoint regarding international and domestic political measures on energy policies under the "Fukushima Effect". Table 3 demonstrates this clearly, as the attitudes that arose in the context of Germany's nuclear phase-out appear to be strongly negative. Concern with the economic repercussions for Japan due to Germany's energy shift, along with environmentally strong European institutions on a broad scale, prevent forming conclusions as to a direct "reverse Fukushima Effect" in terms of promoting a more robust anti-nuclear energy policy in Japan. Moreover, the news coverage of international influence in the *Mainichi* newspaper is almost non-existent.

While former Prime Minister Kan Naoto assessed the possibility of implementing a new energy policy framework in early April 2011[11], the *Mainichi* emphasized the necessity of fulfilling international responsibility towards climate change and decreasing CO2 emissions, noting that Japan depends on nuclear-energy electricity- generating reactors. Moreover, Japan would have to increase its efforts to fulfill the 2020 target set by the international society in order to tackle climate change.

The *Mainichi* is similar to the *Asahi* in referring to the lack of a strong anti-nuclear movement in Japan. A few anti-nuclear sentiments in Japanese society can be found, but in general, the articles suggest that there is no strong anti-nuclear movement in Japan present to catalyze change, because society does not raise its voice[12]. Nuclear power is discussed in regard to energy policy being strongly connected to the economy and is institutionally distant from environmental institutions. This is a major difference compared to Germany where nuclear energy regulation has been located in the environmental ministry since 1986. The energy ministry's anti-nuclear policy as defined by the SDP and any capabilities for political change in Japan regarding energy policy are topics that were not addressed in the *Mainichi* articles. However, to pose the hypothesis of whether to detect an attitude to change governmental institutions in Japan, the analysis provides evidence that the *Mainichi* promotes the status quo, as its articles appear to favor the economy.

As the German government under Chancellor Merkel (CDU) decided to postpone its nuclear phase-out policy after successful lobbying by nuclear-energy-generating industries a few months prior to the Fukushima accident, which was already defined by the 1998-2005 government of Germany's SPD/Green Party coalition, the nature of the *Mainichi*'s "Fukushima Effect" regarding Germany may be referencing

[11] Issued on April 5, 2011.
[12] E.g. Mainichi, August 7, 2011.

how Germany came clear with its antagonistic policy regarding its postponed nuclear phase-out. While indicating the required increase of electricity import from its neighboring countries to compensate for the lost energy source of nuclear reactors, the *Mainichi* shows a general skepticism towards Germany's anti-nuclear energy policy. Putting pro-nuclear countries in a more dominant position in the context of issuing Germany's energy policy supports a weak image of the German government. This aspect is focused on more closely by the *Nikkei*.

(4) Nikkei: Strong frame of Germany's anti-nuclear green party to promote a pro-nuclear path in Japan

The number of articles appearing in the *Nikkei* is similar to that of the *Asahi.* We found a total of 1005 articles using the Nikkei Telecom 21 database. In 73 articles, Germany appeared in the context of nuclear energy and political measures, while 18 had Germany as the main theme. Table 4 shows that the *Nikkei* is more reluctant to show a strong attitude towards Germany's decisions regarding its energy policy under the influence of the Fukushima disaster, as the attribute values of the coded content is focused around the "neutral" characterized sentiment. Where in comparison the *Asahi* shows more evidence to be positive and the *Mainichi* to be negative opted. An interesting result is the *Nikkei*'s attitude in the section "Politics", where the newspaper is divided between positive (17.4%), negative (48.6%) and neutral (34%).

In general, the *Nikkei* shows a strong sentiment towards the major anti-nuclear party in Germany, *Bündnis 90/Die Grüne*, referring on various occasions to one of its founders Jürgen Trittin[13] and constructing news coverage of nuclear energy policy measures regarding Germany around this image. However, in assessing the question whether a fundamental political change would be possible for the high technological Japan[14], the Chernobyl-experienced Germany with its strong environmental lobby could be compared to Japan's economic lobby in relation to political decision-making processes regarding energy issues. This may suggest that similar measures in Japan would require social and institutional changes.

Table 4 Attitude towards nuclear phase-out in the context of Germany's nuclear energy policy shift: *Nikkei*

Section	Nuclear phase-out positive (percentage of articles)	Nuclear phase-out negative (percentage of articles)	Nuclear phase-out neutral (percentage of articles)
Opinion/Commentary	0.0%	50.3%	49.7%
International	0.0%	54.3%	45.7%
Economy/Finance	0.0%	0.0%	100.0%
Politics	17.4%	48.6%	34.0%
Society/Culture	0.0%	0.0%	100.0%

While assessing the possibility for the European Union to strengthen its position regarding environmental and energy policies towards its member states through Germany's influential power, strengthening environmental anti-nuclear power movements in European politics, the *Nikkei* emphasizes the effect that Fukushima had on anti-nuclear sentiment in supporting parties among European member states, particularly in Germany but also in France. Where the *Nikkei* emphasizes the need to increase electricity imports from France and Russia by Germany to compensate for shutting down nuclear reactors and putting the burden of increased costs to proceed with its anti-nuclear policy on its neighboring and economically smaller countries such as the Czech Republic throughout its news coverage, constructs a negative frame around Germany's energy policy decisions. In addition, the argument of a total nuclear phase-out in Germany would be only a label, because a complete phase-out is not possible considering its increased import rate from its neighboring countries, supporting our findings shown in table 4. Thus, the positively shaped image through the focus on the major anti-nuclear party of Germany must be evaluated with caution.

The issue of high costs for political change is a strong frame in the *Nikkei*, considering the intense financial burden for the country due to the Fukushima disaster. Quantitatively similar to the *Asahi*, the *Nikkei* places more attention towards Germany's situation under the Fukushima effect but is far more critical in assessing its nuclear phase-out. While emphasizing Germany's cause of action to be no option for Japan due

[13] Since the 1980s, Jürgen Trittin has been one of the main political actors of the Green Party and was a Diet member until 2013.

[14] E.g. Nikkei, June 2, 2011.

to high costs in terms of energy sources and questioning the actual validity of Germany's political shift, the main frame of the Fukushima effect focuses on Germany's critical economic situation for both society and industry due to the political decision of the nuclear phase-out. However, the framework for a successful implementation of its new energy policy fits into Germany, but would not be applicable in Japan.

(5) Yomiuri: Renewable-Nuclear-Energy mix

Through the Yomidasu Rekishikan database of the *Yomiuri*, of a total of 1,116 articles, 164 articles appeared in the context of nuclear energy policy measures taken in nuclear-energy-generating countries. Germany appeared in that context in 51 articles, where only 5 had Germany as a main theme, but figured a rather neutral/positive attitude towards Germany's political decisions and is less negative in general than findings of previous researches expected.

Table 5 Attitude towards nuclear phase-out in the context of Germany's nuclear energy policy shift: *Yomiuri*

Section	Nuclear phase-out positive (percentage of articles)	Nuclear phase-out negative (percentage of articles)	Nuclear phase-out neutral (percentage of articles)
Opinion/Commentary	49.4%	0.0%	50.6%
International	0.0%	0.0%	100.0%
Economy/Finance	70.1%	0.0%	29.9%
Politics	0.0%	67.1%	32.9%
Society/Culture	0.0%	0.0%	100.0%
Local	0.0%	0.0%	0.0%

The results in Table 5 suggest that Germany was not a major issue in the *Yomiuri* in the respective time frame we investigated after the Fukushima disaster occurred and shortly after Germany set its legal framework of an anti-nuclear energy policy. In the newspaper articles, mentions of Germany were quite few. Thus, the analysis shows attitudes towards Germany's nuclear phase-out as being generally neutral, if mentioned at all, and the role of the "Fukushima Effect" in the discussion is negligible.

While the issues of financial burden on the nation to implement its energy policy measures and Germany's anti-nuclear policy-driven influential power on European institutions appeared in the *Yomiuri* (similar to the *Nikkei*), the *Yomiuri* put a stronger focus on the topic of renewable energies compared to the other three newspapers and emphasized expectations of changes in attitudes towards nuclear energy in Japan as well as internationally. Even though the *Yomiuri* sees validity in pursuing the discussion to eventually promote renewable energy in Japan, due to Fukushima's impact on reconsidering renewable energy possibilities on a global scale, it will not become a nuclear free country, considering nuclear disaster experienced nations such as the U.S. (referring to the Three-Mile Island accident in 1979) and European nations (Chernobyl in 1986) developed nuclear energy technologies as their main energy source[15].

In general, the issue of nuclear energy safety and pressure from focused international attention towards Japan are put in the center of the frame, where international responsibility in terms of measures against climate change dominates the discussion. The strong negative amplitude shown in Table 5 in the politics section is rooted in a frame where information regarding an anti-nuclear phase-out movement in Germany consisting of the nuclear-energy industry (RWE, E.On), diet members within the ruling party (CDU) and social movements. But because of the actual strong consensus among politics, society and eventually industry in Germany regarding anti-nuclear energy policy decisions, this frame did not appear repetitively. The questionable journalistic value of the *Yomiuri* regarding news coverage in the aftermath of 3.11 previous studies assessed, cannot entirely be affirmed, if we compare the framing of the news coverage about Germany's nuclear energy decisions in the aftermath of 3.11 by *Yomiuri* with the *Nikkei* or the *Mainichi*, but the little number of articles covering Germany, may present a false image and must be addressed with caution, when assessing *Yomiuri*'s journalistic value.

Germany is put into the narrative of renewable energies while pointing out difficulties to implement a similar framework in Japan as high costs are involved. Where the *Nikkei* saw the issue regarding Germany's measures to increase the import rate of electricity from its neighboring countries very critically, the *Yomiuri*

[15] E.g. Yomiuri, March 25, 2011 15 E.g. Yomiuri, March 24, 2011.

saw this option as an advantage to implement a new political framework. Considering the result of Fukushima to lead to a complete abolishment of nuclear energy, this would have a great impact on climate change. Implementing higher safety measures for nuclear energy is considered to be a more realistic solution.

6. Conclusion

Ultimately, the instrumentalized Fukushima Dai'ichi nuclear plant crisis propelled the issue of nuclear energy policy, including safety, from being a national policy concern to an international topic. During the six-months period following the Fukushima accident, Germany became a forerunner in abolishing nuclear energy and became an international ideal with its *Energiewende*. However, in comparison, Japan has not taken a similar step. Our findings do not clearly indicate if news coverage of international nuclear power decisions exerted pressure on the DPJ's attempt to abolish nuclear energy or, in the larger picture, canalize international pressure on Japan to change its nuclear policy. However, our comparative analysis of the coverage in the four Japanese newspapers with regards to Germany and nuclear energy policy show diversity in attitudes and opinions in the coverage of Germany's experience, as well as diversity in the policy dimensions in which the topic of nuclear energy policy is discussed.

While framing theory suggests a way of constructing a frame of how one event influences how a topic is perceived by the audience and eventually affects political decision-making processes, in this case, it might be more appropriate to categorize what the frames do not include. When assessing the quantitative news coverage of international nuclear energy policies and their influence on attitude change, the level of interest among the newspaper readership is a major factor. The research reported within does not address that element, and this may be considered a weakness. However, this also suggests a further line of inquiry as research progresses in this area. In addition, in terms of assessing the "Fukushima Effect," the few number of articles in each newspaper suggests that the German case was quantitatively not represented strongly enough to have a qualitative impact. In fact, if we look at the aggregate number of articles covering the issue of nuclear energy policy in general during the six-month period, as well as including those covering nuclear energy policy in relation to nuclear-energy-generating countries, the impact rate of news articles covering the case of Germany must be considered negligible. This in itself poses a possible future direction in this research trend to assess if nuclear power policy is considered to be solely a domestic issue or an international issue.

In terms of differences among the newspapers in general, while the articles in the *Yomiuri* and the *Mainichi* did not appear to emphasize news coverage of Germany's sudden energy transition as a reaction to the Fukushima Dai'ichi nuclear disaster, Germany's situation was a common thread among the articles in the *Asahi*. Whether this difference could be explained in terms of each newspaper's ideological background (the *Asahi* is considered to be the most liberal of the four newspapers) is also an avenue for further investigation. The critical voice of the *Nikkei* towards Germany's shift in abolishing nuclear energy to sustain itself through renewable energies, while putting its neighboring countries in a weaker position and forcing more burden on them to sustain Germany's energy demands in the transition phase until it can sustain itself with renewable energy technologies, reflects Japan's cultural and geographical background as an island state and its immediate need for self-sustainability. The anti-denuclearization *Yomiuri* showed a more neutral/positive attitude towards Germany's *Energiewende* than previous researches suggested. However, the negative frame of Germany's anti- nuclear policies were closely tied to Japan and its lacking capabilities to pursue a similar path, while the neutral/positive majored narrative in the *Yomiuri* emphasized the individual position Germany is having, in regards to the different conditions in Japan.

In conclusion, our assessment of the frames and attitudes concerning nuclear energy policy in Germany as reported in Japanese newspaper articles revealed major differences in the coverage of international energy policy and its possible influence on future policy directions in Japan.

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平成 29 年度 エネルギー政策・言説の日独地域比較　研究報告書
Comparative Energy Policy and Discourse in Japan and Germany
Research Results Compilation

September 30, 2017

編著者	レスリー　タック川﨑　／　発行者　レスリー　タック川﨑
発行所	筑波大学（〒305-8571 茨城県つくば市天王台 1-1-1） Tel: 029-853-4070
印刷所	（株）いなもと印刷（〒300-0007　茨城県土浦市板谷 6 丁目 28－8 Tel: 029-826-1221　Fax: 029-826-1080

ISBN 978-4-902869-34-7