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6-2020

A transnational network for public sector innovation: The impact of a global digital government reform network on public administration at the domestic level

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ABSTRACT

This study investigates the impact of a global E-government reform network on an individual country's E-government performance. As keeping pace with changing environments becomes one of the essential tasks for governments to retain problem-solving capacity, scholars have paid a lot of attention to the determinants of public sector innovation. However, how the ideas of reform and innovation have been communicated at the international or intergovernmental level has been paid less attention. To fill the gap in the literature, we have constructed a social network dataset covering 179 countries for the period 2010 to 2013. This dataset records whether countries sent government officials to E-government related workshops and conferences hosted by the UN and the OECD. The results show that the embeddedness within the transnational network facilitates the pursuit of E-government innovation. We also find that the well-established bureaucratic institution and competitive IT industry contribute to the E-government performance.

KEYWORDS

Public sector innovation, International administrative reform network, E-government, Social network analysis

1 INTRODUCTION

Once, the public sector had nothing to do with innovation. The role of government was confined to providing favorable conditions for the private sector innovations such as protecting property rights, providing basic public goods, etc. As stable administrative structures and services had been regarded as precursors for serving that role, the public sector had not been targeted for the innovation [42].

However, the public sector faces increasing demands for innovation recently. The complex and turbulent modern society brings so-called 'wicked problems' referring to social problems that cannot be solved by the existing and standard approaches due to their complexity [20]. That is, adopting new administrative techniques becomes the primary task for the government to improve problem-solving capacity and as a result, to avoid governmental failures in addressing the social problems [20, 42, 43, 48].

Due to the importance of the subject, both the study of public administration and policy have paid attention to what drives the public sector innovation. There is still room for contributions in the literature, however, in that most of the existing literature addressed only the U.S. and the U.K local government cases, and there are few comparative studies on public sector innovation [50]. That is, the factors that the existing literature has found are hard to be generalized without any cautions because local specific factors might matter. The lack of cross-national analysis is a significant research gap considering that there have been several public sector reform movements such as New Public Management (NPM) that had a global reach [10, 39, 50]. Of course, there have been some scholars interested in the public sector innovation phenomenon at the international level. But, most of them described diffusion processes, and there are only a few studies that include empirical analysis [12, 16, 23, 24, 26, 35].

On top of that, there are scant attempts to capture the influence of global networks for public sector innovation. Scholars stressed that the public administration phenomenon happens beyond national settings, and the domestic administrative structures are nested within the exchange of information and ideas at the international level [2, 22, 31, 46]. However, interests in how new ideas are discussed between countries at the international level and how relationships between countries that emerged around the new ideas give impact on adoption and implementation of public sector innovations have been rarely paid attention [2, 46, 51]. There are some attempts to investigate the influence of transnational networks but actual relational data is rarely utilized. Mainly, they relied on a dummy variable indicating whether the states are members of a certain international forum [16, 24].

To fill the gap in the literature, we investigate the impact of global networks built to promote the digital government on the individual country's E-government performance. In particular, we will apply Hartley, Sørensen, & Torfing [20]'s threefold approaches to understanding the public sector innovation. That is, this study goes over three different institutional approaches (bureaucracy, NPM, and network) in the public sector innovation [19, 20, 42, 48]. We expect that how the public sector is structured gives impacts

on bureaucrats' abilities, motivations, and opportunities to proceed with the innovation. The three strategies are built upon competing assumptions about how the overall structure of administrative institutions should look like [20, 32, 42]. But, Hartley et al. [20] stressed that "there is no reason to believe in 'one best way' to enhance public innovation". The complexities of public problems make the existence of the most superior overarching principle in organizing the public sector impossible. Not only do all the approaches have strengths and weaknesses but also, in reality, each element co-exists in the public sector [32]. As such, this study takes a contingency approach. We take into account all three innovation strategies and see what will be turned out to be the most influential under the context of E-government [20]

We have constructed a social network dataset covering 179 countries for the period 2010 to 2013. This dataset records whether countries sent government officials to E-government related workshops and conferences hosted by the UN Public Institute and Digital Government and the OECD Public Governance Committee. We selected these institutions because they have been active in developing templates and frameworks for digital government innovation [33, 34]. We expect that the conferences held by these intergovernmental organizations served as learning forums where ideas, experiences, norms, and practical recommendations are shared. Thus, the more well-embedded a country is in the global network for E-government reform, the more likely they pursue an E-government agenda actively.

2 THREE APPROACHES TO THE PUBLIC SECTOR INNOVATION

2.1 New Public Management

NPM argues that traditional bureaucratic institutions ossified the public sector. That is, the NPM's approach of the public sector innovation diagnoses the bureaucratic institutions as origins of inherent inefficiency in the public sector. Organizational rules and procedures where bureaucrats should be stick not only routinize their behaviors but also frustrate new attempts to bringing in creative ideas and conducting experiments. As these rules are combined with hierarchical controls, bureaucrats' behaviors deviated from daily organizational procedures are more likely to be penalized. In turn, risk-averse attitudes become dominant in public organizations [19, 42, 48]. In order to break down the traditional administrative arrangements, the NPM perspective comes up with two major approaches: the introduction of the private sector's managerial techniques and the creation of a quasi-market in the public sector [20, 21, 42, 48].

The injection of the private sector's managerial principles such as managerial autonomy, incentives, and performance management systems, is expected to promote public managers' risk-taking and exploration behaviors [21, 48]. That is, the NPM approach views that when public managers have a high level of autonomy and are responsible for results rather than procedural routines, they could fully exert their potential capacity to foster innovations [48]. The motivations of public managers could be boosted further by material performance incentives as well [42, 48]. The creation of a quasi-market in the public sector is based on the idea that reducing public monopoly on public service provision using contracting out

and outsourcing would facilitate market-based competition. Competitions between potential service providers to get governments' contracts would lead to the reduction of costs for providing services. Also while contriving ways to provide the services with low costs, new and innovative approaches in providing public services could emerge [42, 48].

One of the NPM's ideas, the competition between service providers, in particular, is well related to the digital government context because governments usually proceed with contracting out to build digital governance systems [8, 17, 25]. Due to lacking IT skills and financial resources within public organizations, public managers mostly seek private IT service providers who will take on development, maintenance and upgrading the IT systems [8, 25]. Thus, whether IT industries are mature enough to have multiple and competing IT vendors is an important factor for pursuing the E-government initiative [8, 17]. Based on the proceeding discussions, we come up with the following hypotheses.

H1. Countries having a more competitive IT market are more likely to have a higher level of E-government performance compared with countries that have a less competitive IT market.

2.2 Bureaucratic Institutions

In contrast with NPM's critiques that the traditional bureaucratic institutions stifle innovation, there are well-established discussions on positive impacts of well-established bureaucratic institutions on public sector innovations. First, the hierarchy allows elected officials and top public managers to easily set up innovation initiatives and allocate organizational resources to fulfill the agenda. This makes favorable conditions for organizational entrepreneurship of elected officials and public managers. The hierarchy that could mobilize organizational resources and members' attention consistently would be an important asset for leaders to get through the time-consuming process for the realization of the initiatives [20, 42, 48].

Second, as the adoption of new ideas is proceeded by the existing public bureaucracy, the effectiveness of current administrative institutions become important. Understanding the underlying logic of the new initiatives and transforming the public bureaucracy following the initiatives require members' high levels of knowledge and cognitive capacities [9, 29, 48]. Thus, public organizations that retain individuals having expertise and professionalism through the well-established merit-based recruitment systems could have the advantage to pursue public sector innovations [47].

Furthermore, the career separation between politicians and bureaucrats can build trust within organizations that commitments to governmental affairs would be rewarded. That is, when there is a clear career separation, bureaucrats' future career paths will be determined by their level of professionalism rather than being loyal to elected officials. Peers will evaluate their behaviors based on how they fulfilled the goals of organizations and committed to the interest of the general public rather than specific constituencies [12, 15, 37]. This would increase the bureaucrats' willingness to make long-term investments for capacity building and innovation in the public sector [12, 47].

H2. Countries having well-established bureaucratic institutions are more likely to pursue E-government innovation.

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2.3 Learning via Network

Scholars have conceptualized networks as arenas where common views on policy problems and novel solutions emerge through an exchange of a different set of information, experiences, perspectives, etc. [1, 5, 28, 45]. Innovative solutions could be originated from individuals' self-reflection on their experiences and knowledge. But, considering complex and uncertain social conditions that the public sector copes with, the probability of innovation solely initiated by individuals is unlikely. Bureaucrats under constraints of hierarchical structures and managers of organizations competing for governmental contracts would have limited sights to examine complex policy problems in a broader sense [20, 42, 43]. As such, the network perspective on public innovation shifts the attention from entrepreneurial and qualified individuals to interactions of various actors at regional, national or international level forums and conferences [3, 43, 50].

The collaborative innovation scholars expect that collective and deliberative efforts for the production and distributions of new ideas could happen through the network [20, 43, 48]. Epistemic communities composed of policy experts sharing common beliefs and views of policy problems could proceed with a series of behaviors like a debate, persuasion, and exchange of information. Through the processes, the turbulent environments could be easily interpreted and new common solutions also likely emerge [45, 48, 50].

Furthermore, the dissemination of the ideas could be more effective when it is done collectively rather than unilaterally [14, 38, 48]. Suppliers of innovations should not be stuck to a few successful cases and ready-made templates in order to facilitate the circulation of ideas and innovations [38, 48]. They could make innovative ideas more feasible by contacting local policy-decision makers. The suppliers learn from adopters about details regarding specific local contexts and practical problems that should be taken into account for realizing the ideas. This allows the suppliers to come up with relevant and applicable suggestions. This will eventually make the adopters easily analogy the suppliers' cases and figure out whether initiatives of other governments are effective and applicable to their governments. That is, uncertainties and risks of adopting new approaches could be reduced [14, 18, 48]. Based on the discussion, the following hypothesis is suggested.

H3: The more well countries are immersed in the networks the more likely they are to pursue the digital government agenda.

2.4 Discerning the effects of the networks

When collaborative innovation scholars include the network in the threefold model, they expect that the network brings about collective learning other than other effects. However, as policy diffusion scholars pointed out, the network is not only the place where collective learning happens. Rather, the networks could serve as a place where fad-seeking activities take place [5, 40, 41, 52].

The networks could serve as places where attractive trends are circulated. Countries are exposed to cultural norms and ideological beliefs emerging from a 'World Society' [10, 27, 39, 52]. When there are the dominant and legitimate trends within the networks, isomorphic powers could exert because countries that do not adopt the trends would feel lagged behind and pressured to catch up with the attractively looking trends. That is, the decision-makers could seek external legitimacy with expectations that the adoption of the new trends shows their confirmability for the global norms [13, 27, 41, 52].

However, clarifying empirically one of which the mechanisms worked is challenging because collective learning and the circulations of fads would happen at the same time while decision-makers are interacting with one another. One way to distinguish the effects is by focusing on a long-term effect. According to Meyer et al. [27] and Weyland [52], the influences coming from the emulative forces are more likely to have short-term impacts. The decision-makers jump into conclusions without the thorough examinations of possible consequences, the fitness of the initiatives with local circumstances, and costs-benefits analyses. These decisions based on exaggerated and unfounded hopes end up with slowing down motivations for pursuing the innovations as more information about the implementation process and outcomes revealing the reality becomes available.

On the other hand, collective learning more likely has lasting impacts because it involves deep understandings of ends and means and expected consequences of the innovations. Torfing [48] points out "While the circulation of information may inspire actors to imitate solutions developed elsewhere, it does not produce learning in the strict sense of revising prior beliefs, ideas, and understandings that are results of critical reflection upon empirical and theoretical experiences". Based on the discussion, the following hypothesis is suggested.

H4: If the networks serve as a place where collective learning happens, the networks will have long-term impacts on pursuing the digital government agenda.

2.5 Transnational Networks Set up by Intergovernmental Organizations

This study specifically pays attention to the influence of E-government related conferences hosted by the OECD and the UN. Both international organizations are selected because they not only have established regional and international networks around the public sector innovation but also have promoted ICT technology in governments as a key agenda for innovating public administration [6, 33, 34]. In terms of the UN, E-government has been one of the main agendas of the UN's effort to innovate public administration as of the first Global Forum on Reinventing Government in 1999. The UN's interest in the quality of public administration has started in 1995 when the UN General Assembly passed a resolution about the importance of public administration to achieve developmental goals. Since then, the UN has tried to build academic and practical networks for public administration. The UN Department for Economic and Social Affairs (UNDESA) and the Division for Public Institution and Digital Government (DPIDG) are main implementation agencies. Also, to build regional public administration reform networks and connect them, the UN established the United Nations Public Administration Network (UNPAN) and UN Project Office on Governance (UNPOG) [6, 34].

OECD also started to be interested in the importance of public administration with the establishment of the Public Management Committee in 1990 which changed its name to the Public Governance Committee (PGC). The PGC promoted the E-government

Table 1: The Number of Events Identified and Coded

	2010	2011	2012	2013	Total
UN	18 among 27	19 among 40	13 among 19	12 among 21	62 among 107
OECD	11 among 15	7 among 10	10 among 15	7 among 17	35 among 58
Coded	29	26	23	19	97
Total	43	50	34	38	165
Percent	67.4	52.0	67.6	50	58.8

reform agenda by suggesting it as one of the important building blocks for improving public governance. For instance, OECD has hosted a network for senior E-government officials where the E-government reform agenda could be shared and discussed. As with the UN, OECD tried to make regional networks and reach its connections beyond members by means of the MENA-OECD initiative covering the Middle East and North African countries and the SIGMA, a joint initiative of the OECD and the EU to improve the quality of public governance in Central and Eastern European countries [33].

3 RESEARCH DESIGN

3.1 Network Data Collection

We go over whether individual countries sent public officers out the conferences, workshops, and symposiums hosted by the OECD and the UN to build a network dataset to picture social relations between states. We stepped the following orders. First, we investigated the calendar of meetings of OECD and UN through websites. Specifically, the agencies of UN and OECD (UNPAN, UNDESA, DPIDG, UNPOG, OECD-PGC, OECD-MENA, and OECD-SIGMA) are investigated to find E-government related forums. Including criteria is whether the forums deal with at least one of the E-government related subjects such as citizen participation via the Internet, E-procurement, administrative simplification through ICT technology, Open government, Smart City, etc. We identified the relevance of events by going over objectives of the meetings, background documents, presentation files, and policy reports released after the conferences.

For the period 2010 to 2013, 165 e-government related events are found and we get lists of participants from 97 among 165 events (58.8 %). Table 1 shows the number of events we identified and how many events provide the lists of participants. We couldn't find the list of participants from all of the events because the intergovernmental agencies do not provide any events related documents and webpages for the events are not accessible. Although the list of participants from all of the events is not collected, a sufficient number of events is collected to identify the intergovernmental level of learning networks around the E-government innovation. Not only does the network dataset include key leading countries in E-government reform such as South Korea, Singapore, and New Zealand but it also covers a total of 179 countries. That is, we collect high volumes of the network to capture social structures for the E-government innovation without missing key actors.

After identifying people attending the forums, we build a two-mode network data by coding a relationship between countries and events. For doing this, we made a rectangular table where

the rows and columns refer to different sets of entities: the list of events is put at the rows and countries are put down at the columns. By investigating the lists of participants, we coded 1 in cells when public managers from certain country i participated in an event j and 0 when any public officers from country i would not participate in the event. Whether the participants work for governments is easily discerned because every list of participants provides information about affiliations of individuals.

Our network data is related to the concept of boundary spanners because we collect network data based on governmental officials' participation in the conferences and workshops. That is, public administrators are supposed to make meaningful ties between governments [53, 54]. Boundary spanners refer to agents who work at the inter-organizational context. By reaching out to external actors, they foster communications between organizations and are more likely to be exposed to external ideas and information. When it comes to an intra-organizational perspective, they are carriers of new ideas and innovation because they disseminate new information inside organizations by connecting peers and other members [36, 53, 54]. We expect that public officers who participated in the international forums would be immersed in the knowledge production and learning process mentioned above and bring the information into organizations [7, 53, 54].

3.2 Measurement

3.2.1 Dependent Variables. Dependent variables of this study are harvested from the UN E-Government Survey. Among various indices of the survey, we utilize two subcomponents of the UN E-Government Survey: the Online Service Index and the E-participation Index. The Online Service Index aims to capture the degree of public service delivery by ICTs. For doing this, the index focuses on the levels of sophistication of the central governmental portals and the cohesion of governmental services via the Internet. The E-participation index measures how much the Internet has been served as a tool to promote citizens' influences on the public sector. The index captures three dimensions of citizen participation through the Internet: the citizens' access to public information, the citizens' engagement in online public discourse on making new policies and public services, and the influence of e-participation on decision-making [49]. As one of the purposes of this study figures out whether the immersion in learning environments have the lasting impacts on pursuing E-government innovations, this study utilizes UN E-government surveys released in 2014, 2016, and 2018.

3.2.2 Network Variables. Probability of learning from other countries' experiences or knowledge-producing activities increases

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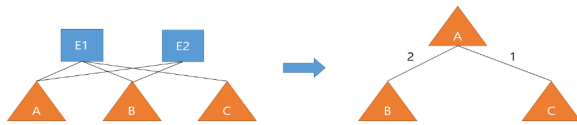dg.o '20, June 15–19, 2020, Seoul, Republic of Korea

Figure 1: An Visual Explanation on Building the Network Variables

along with the number of co-attendance of the events with other countries. But, if we only take into account the number of events, then we lost the other important dimension of the relationship: who learns from and with whom. This is an important dynamic we should not miss because countries would have different levels of influence on international forums. Some countries take really important roles in the learning process compared with other countries because of their expertise, high levels of E-government performance, and long-term commitments to the agenda. Thus, countries are more likely to get important insights when their officers participate in events where high performers participated. On the other hand, when public officers attend forums where delegates from countries that have not been interested in E-government and do negligible efforts only participated, they are less likely to learn from peers or might raise questions of the importance of E-government reform agenda.

In sum, we need to take into account both the number of co-attendance of the events and individual countries' varying levels of influences together to fully take into account the influence of the network. To account for the dynamic, following Brian [7], we calculated a weighted average value of the E-government performance of a country's fellow states co-participating the same events.

The variable is an analogy with the special lagged variables from spatial econometrics but a difference is that we take into account the number of co-attendance instead of the geographical proximity [7]. Figure 2 shows an example of how we made this variable. A graph in the left side is a two-mode network data showing relationships between actors (country A, B, and C) and events (E 1 and E 2). We transformed the data to only consider only one type of node – a country as shown in the graph in the right side of Figure 2. In this case, ties between states refer to the number of events that two countries co-participated. In our example, country A attend two forums together with country B and one forum with country C. After transforming the network data, we utilized pervious E-government performance to build up weighted network variables. That is, when β and γ refer to previous E-government performance for the country B and C respectively, an impact of learning environments on country A is equal to $(2\times\beta+ 1\times\gamma) /3$: (Ties with country B × country B's previous E-government performance + Ties with country C × country C's previous performance) / total number of ties of country A.

We performed this process for two dependent variables separately to come up with weighted network variables for E-participation and Online services, respectively. To make these variables, the entire period of two-mode network data is aggregated and the UN E-government survey in 2008 is utilized.

3.2.3 Other Key Independent Variables. In terms of the quality of bureaucratic institutions, we utilize government effectiveness index from the Worldwide Governance Indicators released by the World Bank. This measure is well corresponding with our theoretical discussions because of its focus on the quality of input-side of governmental institutions such as the quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of the government's commitment to policies [11].

In order to account for the perspectives from NPM, two measurements are included in the model. First, a binary variable indicating whether each country has an independent regulatory authority for facilitating competition in the IT industry is used. The variable comes from the International Telecommunication Union (ITU)'s ICT-EYE 2013 report. The other variable is a level of IT market competitiveness taken from the Networked Readiness Index in 2013 released by the World Economic Forum. This indicator is built by going over competition status (monopoly, partial competition, and full competition) of 17 categories of ICT services. The higher the score is, the level of competition in the IT market is high.

3.2.4 Control Variables. First, we take into account the geographical proximity. Policy diffusion scholars have long relied on geographical proximity as the key driver of innovation [4, 5, 28]. Following Brian [7], we calculate simple means of 10 closest neighboring countries' the Online Service Index and the E-participation index in 2008. The distance data is harvested from the 'CEPII-Research and Expertise on the World Economy'. The research institute measures the distances between the two countries by calculating the geodesic distance between capital cities.

The pursuing E-government agenda also depends on the levels of citizens' demands. As the domestic demands for E-governance could be increased along with the general living standards for citizens, we introduced the Human Development Index that measures life expectancy, a level of education, and income levels (GNI per capita) of individual countries into the model. Also, the number of internet users could drive the demands so that the proportion of populations using the Internet is also taken into account [24, 44]. The economic conditions of countries such as GDP per capita and annual growth rate of GDP are controlled because the costs for the introduction, maintenance, and upgrade of the E-government system are expansive [30, 44]. The level of exposure to the world economy could be one of the drivers for pursuing the E-government reform considering that countries highly exposed to the world economy are more likely to concern their general IT competitiveness. To take into account the possibility, Foreign Direct Investment is introduced into the model. All the control variables are harvested from the Quality of Government Standard Dataset 2015 [11]. Table 2 provides summary statistics.

4 RESULTS

In this section, we investigate the influences of the threefold approach on the pursuit of E-government innovations. To prevent problems from heteroscedasticity, regression with the robust standard error was utilized. Model 1-3 in Table 3 report the results for the Online Service Index and model 4-6 show the impacts of the explanatory variables on the E-participation Index. In the second

Table 2: Summary Statistics

Variable	Obs	Mean	SD	Min	Max
OnelineService_2014	193	0.392	0.266	0	1
OnelineService_2016	193	0.462	0.272	0	1
OnelineService_2018	193	0.569	0.269	0	1
Eparticipation_2014	193	0.395	0.262	0	1
Eparticipation_2016	193	0.462	0.271	0	1
Eparticipation_2018	193	0.565	0.282	0	1
Weighted Network_E-participation	179	0.268	0.045	0	0.432
Weighted Network_Online Service	179	0.443	0.065	0.001	0.660
Government Effectiveness	192	-0.066	0.994	-2.217	2.174
IT regulatory Authority	198	0.677	0.469	0	1
Competition in IT industry	194	1.545	0.589	0	2
Democracy	193	0.606	0.489	0	1
Human Development	186	0.692	0.156	0.345	0.945
Internet User	189	40.884	28.95	0.9	96.55
GDP per Capita	187	8.629	1.472	5.645	12.06
Annual GDP Growth	185	3.571	5.077	-36.7	34.22
FDI	184	4.317	6.732	-25.048	41.81
Neighboring Effects_Online Service	169	0.354	0.157	0.091	0.753
Neighboring Effects_E-participation	169	0.199	0.111	0.032	0.534

row, what years of the index are utilized as dependent variables is suggested.

The exposure to the transnational network facilitates the governments' efforts to improve public service delivery via the Internet when we consider the Online Service Index in 2014 and 2016. The weighted network variables also facilitate the E-participation throughout the model 4-6. When it comes to the quality of bureaucratic institutions, it is turned out that the government effectiveness variable has significant impacts throughout all models. The existence of IT regulatory authority and the level of competition in the IT industry which is included to take into account the NPM perspectives also have facilitated the pursuit of the E-government initiatives except for model 1 where the competition in the IT industry variable is not statistically significant.

When it comes to the control variables, the countries having the democratic political system do not have any advantage over the authoritarian regime countries. Model 1 and 4 show that the countries having the authoritarianism system are more likely to be active in the E-government initiatives and there are no meaningful relationships between two variables in other models. Also, citizens' demands drive the implementation of E-government innovations. Human development indicators and the percentage of Internet Users in the population are positively associated with both of the indexes. Among the variables indicating the economic conditions of the individual country, annual GDP growth facilitates the improvement the governmental service via online. Lastly, the neighboring effects are not statistically significantly different from the diffusion studies.

Overall, we found that the network did not serve as only the place for distributing fads. It took the role of facilitating learning between the governments as well. As this data does not measure the motivations of public officers who take the role of a boundary spanner, we

still do not have a clear conclusion about what is the underlying mechanism of the E-government reform network. However, we could have some levels of confidence in that the transnational network has both short and long-term effects. The second implication is that there is no best approach among the threefold strategies for public sector innovation. The result supports the Olsen [32]'s point of view that the public bureaucracy is "a repertoire of overlapping, supplementary, and competing forms". That is, although the three approaches stress different and competing beliefs in organizing the public institutions, they cannot replace one another and rather, are supplementary. There is no such principle allowing the construction of the public organizations to solve all dimensions of the public issues, at least in terms of public innovation [20, 32].

5 CONCLUSION

The aim of the study understands what drives the pursuit of the innovation of public organizations. We proceeded with the Large-N comparative study in the contexts of E-government. This paper made the following several contributions. First, although there is a rich body of literature on public sector innovation, there have been lacking empirical attempts to investigate the influences of three forms of public institutions [20]. We improve the literature by figuring out the importance of the three forms using the Large-N research design. Second, this study made contributions to the comparative public administration field. There is a lacking number of studies conducting the cross-national analysis to empirically figure out how public sector innovations at the international level happen. Besides, few studies tried to investigate the linkage of intergovernmental organizations and the domestic public administration although the PA disciplines have well recognized the fact that public administration is nested within the global influences [2, 22, 31]. Furthermore, there are a few studies that take into account the

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Table 3: The Impacts of the Three Innovative Strategies on E-government Performance

	Online Service Index			E-Participation		
	2014	2016	2018	2014	2016	2018
	(1)	(2)	(3)	(4)	(5)	(6)
Weighted Network	0.742***	0.667***	0.461	1.350***	0.885*	0.809*
	(0.219)	(0.241)	(0.289)	(0.473)	(0.517)	(0.455)
Government	0.0865***	0.0538**	0.0618**	0.0691**	0.0478*	0.0549*
Effectiveness	(0.0266)	(0.0239)	(0.0266)	(0.0281)	(0.0256)	(0.0310)
IT regulatory	0.0998***	0.0672**	0.0792**	0.0999***	0.0807**	0.0844**
Authority	(0.0297)	(0.0320)	(0.0319)	(0.0321)	(0.0354)	(0.0349)
Competition in IT	0.0406	0.0665**	0.0506*	0.0654**	0.0654**	0.0690**
industry	(0.0266)	(0.0289)	(0.0291)	(0.0262)	(0.0293)	(0.0292)
Democracy	-0.111***	-0.0327	-0.0120	-0.0890***	-0.0275	-0.00480
	(0.0256)	(0.0269)	(0.0273)	(0.0282)	(0.0281)	(0.0291)
Human	0.430	0.754***	0.792***	0.592**	0.904***	0.820***
Development	(0.267)	(0.243)	(0.249)	(0.290)	(0.283)	(0.273)
Internet User	0.00285**	0.00413***	0.00386***	0.00181	0.00355***	0.00431***
	(0.00131)	(0.00127)	(0.00118)	(0.00145)	(0.00134)	(0.00124)
GDP per Capita	-0.0100	-0.0550**	-0.0659***	-0.0251	-0.0698**	-0.0731***
	(0.0243)	(0.0231)	(0.0237)	(0.0247)	(0.0284)	(0.0275)
Annual GDP growth	0.00856**	0.00843**	0.00864**	0.0115**	0.00909**	0.0102**
	(0.00411)	(0.00378)	(0.00428)	(0.00464)	(0.00432)	(0.00439)
FDI	0.000740	-0.00279	-0.00171	0.00160	-0.00186	-0.0000136
	(0.00162)	(0.00173)	(0.00155)	(0.00198)	(0.00191)	(0.00164)
Neighboring Effects	-0.0475	-0.110	-0.0904	-0.0335	-0.0954	-0.179
	(0.137)	(0.125)	(0.111)	(0.194)	(0.162)	(0.160)
_cons	-0.326*	-0.129	0.141	-0.374*	-0.0630	0.101
	(0.185)	(0.197)	(0.213)	(0.202)	(0.224)	(0.219)
N	146	146	146	146	146	146
adj. R2	0.703	0.718	0.685	0.593	0.665	0.659

Robust standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

transnational networks employing explicit relational data rather than a simple dummy variable indicating the participation in a certain forum.

However, there are some limitations as well. First, although we utilized UN E-government measures released at different times, this paper cannot fully capture the dynamics happing overtime in that key explanatory variables are fixed. Second, although we try to discern whether the transnational network's effects represent the following fads or the learning activities, it is still hard to say that this study clearly distinguishes the effects. This is because the network data is based on whether each government sent a high level of government officials to conferences held by the OECD and the UN by examining the relevant documents. The more accurate measurements capturing motivations behind the boundary spanners would be required to overcome the limitations. Lastly, as the social network data is outdated. Although the data help us to investigate whether it has lasting impacts on E-government performance, we need data that captures more recent trends in the interactions between countries at the international level.

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