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Inter-governmental Collaborative Networks for Digital Government Innovation Transfer – Structure, Membership, Operations

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Abstract. Digital government refers to the transformation of government organizations and their relationships with citizens, business and each other through digital technology. It entails digital innovation in processes, services, organizations, policies, etc. which are increasingly developed and tested in one country and transferred, after adaptation, to other countries. The process of innovation transfer and the underlying information and knowledge sharing increasing take place through networks. The aim of this study is to identify various forms of such networks, their structures, membership criteria and modes of operation. The study relies on the analysis of literature on innovation transfer, collaborative networks and inter-governmental collaboration, and a survey of existing inter-governmental networks for digital government innovation transfer. The key finding is that such networks are a growing form of international collaboration and an instrument in global economy.

Keywords: digital government, innovation transfer, collaborative networks

1 Introduction

Digital government transformation has advanced rapidly over the past 15 years, as shown by increasing number of countries with very high (between 0,75 and 1,00) value of the United Nation's e-Government Development Index (EGDI) [1], from 10 in 2003 to 40 in 2018, and a decrease in the number of countries with "very low" (between 0,00 and 0,25) value of the EGDI, from 38 in 2003 to 16 in 2018. Thus some countries have gained deep knowhow in digital government, making their power, transport, security and other systems ready to interconnect with other systems, while others stand to learn from them, and to connect or even adopt their systems.

However, successful transfer of digital government solutions is difficult due to different conditions – technical, legal, economic, cultural, etc. existing in the donor and recipient countries [2][3]. This and continuous pressure for improvement in public infrastructure and services, highlight the importance of knowledge sharing and innovation transfer between government organizations [4][5]. Inter-organizational

information sharing delivers higher information quality, improved decision-making, increased productivity, and service integration [6]. Inter-governmental information sharing relies on collaborative actions by diverse agencies from different countries, increasingly coordinated through inter-governmental collaboration networks. Such networks constitute multi-organizational arrangements for solving problems that cannot be achieved, or achieved easily, by a single organization. They rely heavily on informal interaction, persuasion, and information to deal with critical areas [7].

While the existence of networks that specialize in digital government innovation transfer is documented in literature [5][6][8], comparative studies are lacking, and questions remain concerning objectives, membership criteria, structure and mode of operation adopted by such networks. This paper aims to fill this gap based on the combination of literature review on technology transfer, collaborative networks and inter-governmental collaboration, four case studies of collaborative networks for inter-governmental technology transfer, and cross-case analysis. The case studies include networks run by countries with advanced digital government capabilities and interest in transferring such capabilities to other countries – Estonia, Korea, Singapore and USA. The main message uncovered by this study is that international digital government collaboration has become an instrument in global economy.

The rest of this paper is structured as follows. Section 2 present a literature review on technology transfer, collaborative networks and inter-governmental collaboration. The main outcome is the framework for inter-governmental networks for digital government technology transfer, which is presented in Section 3 along with research questions and how they are addressed. Section 4 presents and analyzes four case studies of such networks using the framework in Section 3. Section 5 discusses implications and lessons learns from this work, and Section 6 concludes with summary of the findings, limitations of this research, and plans for future work.

2 Background

This section presents the outcomes of a literature review on technology transfer, collaborative networks and inter-governmental collaboration. The review follows the approach described in [9] and the outcomes, described in subsequent sections, lead to the definition of research questions and a framework in Section 3.

2.1 Technology Transfer

The introduction of digital technology into government happens in stages of digital government evolution [11], from Electronic Government "when ICT is used to transform the internal organization and working of government", to Electronic Governance "when ICT is used to transform the relationships between government and citizens, businesses, other non-state actors and other arms of government" [10], to Policy-Driven Electronic Governance, which supports "efforts by countries, cities, communities and other territorial and social units to develop themselves" [11].

The process of adapting a digital government application from the donor to the recipient context is referred to as digital government technology transfer [12]. The process is hindered by contextual distances between participant countries which

include culture, politics, organizational issues, relations, knowledge, resources, and physical and technical conditions [13].

Digital government is essentially based on imported designs, and digital government applications are isolated technical artefacts [14]. Digital government technology transfer concerns the transformation of government administration, information provision and service delivery by new technologies [15]. In this perspective, digital government initiatives are associated with the deployment of a complex digital infrastructure [16] involving national and local governments, agencies, NGOs, international organization, and citizens [17]. The potential to support sustainable socio-economic development is well supported, e.g. [18].

According to [19], the greater the value of the donor's knowledge stock, the greater its attractiveness to other countries. This is consistent with diffusion of innovation [20], a process by which an innovation is communicated through certain channels among the members of a social system and by which alternation occurs in the structure and function of such system as a kind of social change. While diffusion is crucial to fully benefit from innovation, the diffusion of digital government innovations is uneven [18]. A small number of rich countries are seen as vanguards of digital government, while poor countries experience fragmented digital government implementations. As the deployment of digital government in developing countries should address specific contextual characteristics of such countries and their sectors and organizations [21], international technology transfer should be a learning process based on trust [17], supportive institutional design [22], policy and legal adjustment [17], and the explicit characteristics of the technology being transferred [12].

Technology transfer includes transfer: between individuals, from individuals to groups, between groups, across groups, and from groups to organizations [17][23]. International technology transfers are guided by profit [24], and include trade flows between parties [17], e.g. a donor country gaining advantage for purchasing raw material from the recipient, and profiting from technology maintenance [25]. However, digital government technology transfer has often bilateral character, e.g. in Mozambique [26], Sri Lanka [16] or Malaysia [27].

2.2 Collaborative networks

Networks refer to multi-organizational arrangements for solving problems that cannot be achieved, or achieved easily, by a single organization. A collaborative network is a network containing a variety of entities that are mostly independent, geographically dispersed, and varied in terms of operating environment, culture, social capital and goals, but that collaborate to achieve common or compatible goals [28]. Participation in such networks is aligned to increasing competitiveness, reaching new knowledge, sharing risks and resources, and joining complementary skills. A crucial factor for networks and an alternative governance mechanism is trust [29].

According to [30], networks are characterized by: orientation of members and their commitment to goals, organization of the network including the intensity and breadth of its linkages, and the aim including complexity of purpose and the scope of the efforts. The formation and operation of the network reflects the characteristics of its participants and their expectations of the benefits and barriers [31]. Network

constitution happens through [32]: activation – prior to successful inter-organizational policy formation; framing – establishing rules, influencing values, and shaping perceptions of the network; and synthesizing – creating the environment and enhancing the conditions for productive interactions among participants.

From the digital government perspective, the concept of public sector knowledge networks is used – inter-organizational relations, policies, structured information, professional knowledge, work processes and technologies brought together to achieve a collective public purpose [31]. They are a type of collaborative networks: led by government entities [32], having some formal elements but not defined by the law [31], enabling members to share knowledge. Network-level knowledge sharing and collaboration assumes that at least three actors pursue a common goal and take collective actions to achieve this goal by producing and sharing skills, expertise, experience, information and data [33].

2.3 Inter-governmental collaboration for technology transfer

Previous concepts should be regarded as the context for inter-governmental collaboration within collaborative networks. In this context, network participants are countries or territorial units, represented by government authorities. Factors that affect multinational digital government collaboration, interoperability and information sharing include: collaboration factors, value network factors, cross-border factors, and integration and interoperability factors [17].

Scarce publications address the structure of inter-governmental collaboration. Thus, a rational formal structure is assumed to be the most effective way to coordinate and control complex relational networks involved in such collaboration [34]. According to [35], three types of inter-organizational collaborations are: public-public, public-non-profit, and public-private. The first includes horizontal agreements between governments at the same level, and vertical agreements or intergovernmental alliances between levels. The latter need legal authorization, they operate by local agencies. According to [36], inter-organizational trust and collaboration is often not supported by institutional arrangements and organizational structures.

Inter-governmental collaboration takes place in specific contexts. Well connected members introduce trust, norms and social sanctions based on mutual expectations and obligations [37]. Cooperation incentives are greater within networks as "competition is usually minimized" and "organizations generally trust each other to a greater degree" [38]. Within collaborative networks, information is shared easily, and members can build and manage their reputation [39]. Inter-governmental collaboration within networks operates under organizational missions, existing legal and policy frameworks, assigned organizational structures, management practices and each countries' technological infrastructures and capabilities [7].

While research on networks as an element of public policy process is covered in literature, e.g. research on structure, function, management and outcomes of networked forms of organization [32][17][40], the topic of organizational networks as an instrument of public management in the international context is relatively recent. This study address this knowledge gap by exploring the structure and operations of inter-governmental collaborative networks for digital government innovation transfer.

3 Research Design and Method

This work studies inter-governmental collaborative networks for digital government innovation transfer. We pursue three research questions:

1. What are the aims, strategies and missions of such networks?
2. What are the membership, structures and operations of such networks?
3. How are the networks facilitating digital government innovation transfer?

These questions were addressed through exploratory and comparative case study research. Such research is focused on understanding the dynamics present within a small number of cases in their real-life context [41]. It is applied when the topic is complex, there is a lot of theory available, and the context is important [42].

The main outcome of the literature review is an integrative framework for inter-governmental collaborative networks for digital government innovation transfer. The framework, depicted in Table 1, is instantiated for particular donor, recipient and the innovation transfer initiative. It consists of general information including objectives, mission, strategy, legal framework and contextual distances [43]; membership criteria including participants [17] and their status [17]; structure including collaboration types [35], structural and individual behavior [17], institutional design [22], managerial tasks and roles [32] and decision-making authority [22]; and operation including incentives and their types [35], transactions [17], trade flows [17], deliverables [17], policy and legal adjustments [17], and information integration [17].

The framework is applied to develop and analyze four case studies of such networks. The enquiry was limited to official websites and legal acts, agreements and statuses available online. Case study selection was based on the donor countries' digital government maturity and active international transfer to third countries.

Table 1. Framework for inter-governmental collaborative networks

General	Basic information	Donor	Objectives
		Recipient	Strategy
		Innovation transfer	Mission
			Legal framework
	Contextual distance [43]	□ cultural □ intention □ physical □ political	□ knowledge □ relational □ technical □ resource
Membership	Participants [17]	□ international organization □ national government □ citizens	□ local government □ agencies □ NGOs
	Participant status [17]	□ equal	□ unequal
Structure	Collaboration type [35]	□ public-public □ public-private	□ public-non-profit
	Promotes cooperation [17]	□ yes	□ no
	Individual behavior [17]	□ trust	□ experience
	Institutional design [22]	□ level of centrality: low, middle, high □ assigned organizational structures: yes / no □ management practices: yes/no	

		□ inclusion criteria	□ exclusion criteria
	Managerial tasks [32]	□ activating □ mobilizing	□ framing □ synthesizing
	Managerial roles [32]	□ international organization □ local government □ citizens	□ national government □ agencies □ NGOs
	Roles [17]	□ individuals □ business units	□ groups □ organizations
	Decision making [22]	□ international organization □ local government □ citizens	□ national government □ agencies □ NGOs
Operation	Incentives [35]	□ technical □ political	□ organizational
	Incentive type [35]	□ positive (outcome)	□ negative (conflict)
	Transactions [17]	□ individual – group □ unit – organization	□ group – business unit
	Trade flows [17]	□ goods □ investments	□ people
	Deliverables [17]	□ tangible	□ intangible
	Policy adjustments [17]	□ international □ state □ local	□ regional □ national
	Legal adjustment [17]	□ international □ national	□ regional □ local
	Information integration [17]	□ yes	□ no

4 Case Studies

This section presents four case studies of inter-governmental collaborative networks, and conducts cross-case analysis. All case studies identify a donor country with mature digital government and related international innovation transfer, and one instance of such transfer from the donor to recipient country. Each case study presents the organization responsible for international dissemination of the donor country's digital government innovations, and analyzes one example of innovation transfer from to a third country using the framework in Table 1. The case studies are presented in Section 4.1 (Estonia), Section 4.2 (Republic of Korea), Section 4.3 (Singapore) and Section 4.4 (USA). Section 4.5 includes cross-case analysis.

4.1 Estonia – e-Governance Academy

Estonian e-Governance Academy was established in 2002 as a non-profit think tank and consultancy organization aimed to help "governments increase their governance efficiency and improve their democratic processes" [44]. In 2015, Tunisia joined the Estonian development cooperation project, managed by e-Governance Academy, to develop the legal and organizational framework for e-governance and look into the possibilities of having a single identifier for Tunisian citizens.

Five contextual distances were identified between donor and recipient countries: cultural, organizational, knowledge, resource and technical. The cultural distance results from differences in national cultures, particularly the rights of citizens to privacy and freedom of expression. Due to previous Tunisian institutional experience

in digital government assistance, this distance tends to shrink, establishing an adequate level of trust to build working relations. The organizational distance refers to the constituted independence of each government agency in Tunisia, resulting in the lack of unique identification. The knowledge distance was estimated as appropriate for knowledge transfer. The resource distance is expressed by the level of funding from the Estonia to support the Tunisia project. The technical distance is primarily due to the lack of data integration and information sharing between Tunisian agencies.

The project realizes public-public collaboration. Structural and individual behavior enhanced inter-governmental collaboration by promotion of cooperation and acclamation of trust and institutional experience. We could not identify inclusion or exclusion criteria within this project, or explicitly assigned organizational structure. However, project management was performed by the Academy including activating, framing, mobilizing and synthesizing tasks. The roles were assigned to individuals and organization. The project features positive incentives, and lack of negative ones.

4.2 South Korea – e-Government Cooperation Center

Republic of Korea shares its best practices in public administration with countries around the world through its official development assistance program. The aim is "to contribute to the advancement of the global community as a pioneer in administrative innovation" [45]. The organization responsible for international cooperation in digital government is e-Government Cooperation Center (eGCC). eGCC selects a recipient country using existing cooperative relationships, willingness of the partner country, etc. The cooperation is launched through a high-level dialogue with the recipient. eGCC Committee is established with experts from both countries to decide on the content of cooperation, and to execute managerial tasks. Each cooperation program is aligned to trade flows where Korean government provides USD 1 million and the recipient country provide additional funds subject to negotiation. In the operation phase, e-government experts are dispatched to provide training, consulting, etc.

In 2017, the eGCC cooperation was established between South Korea and Kenya with the aim to: materialize governmental e-offices, share residential ID experiences, provide consultations, and plan the national information infrastructure. Tangible and intangible deliverables, e.g. ICT infrastructure or knowledge sharing, were produced. This cooperation also forced Kenya to adjust its legal frameworks.

The eGCC cooperation type is public-public, enforced by structural and individual behavior. Contextual distances include: organizational distance – related to structure and processes, relational distance – establishing previous positive ties, resource distance – lack of funding and qualified staff, physical distance – geography, and technical distance – low information sharing between agencies.

4.3 Singapore – Infocomm Development Authority International

Countries interested in importing Singapore's digital government technology could turn to IDA International, a subsidiary of Infocomm Development Authority of Singapore (IDA). Established in 2008, IDA International served as the execution arm of public service infocomm collaborations between Singapore and governments

around the world [46], focused on delivering public infocomm services, including digital government consultancy, master planning, national infocomm planning, industry and cluster development, and program management.

In 2007, IDA and the Information Technology Authority of Oman signed a MoU to facilitate the use of ICT in government and various economic sectors of Oman. In particular, the transfer was about developing the urban portal, a new service delivery platform for connecting government and citizens. This public-private collaboration joined government agencies and private organizations. Four contextual distances were identified: cultural, political, relational, and knowledge. Unfortunately, the official websites of the Singapore and Oman governments do not provide further information as to the operation, inclusion criteria, and the structure of the collaborative network.

4.4 USA – USAID Global Development Lab

The United States Agency for International Development (USAID) supports inter-governmental collaboration on digital government to strengthen democratic governance through open, responsive, and accountable institutions and processes that serve the needs and preferences of the public. The USAID Global Development Lab is an innovation hub that works external partners to produce innovations and to open development to people. The Lab works with impact investors to catalyze private capital for businesses and to strengthen the environment for entrepreneurship.

The Digital Liberia Electronic Government activity is a one year program funded by the USAID Global Development Lab with the aim to improve Liberian Government's performance through sustainable utilization of ICT-related systems, processes, and procedures at targeted ministries, agencies and commissions. Technology transfer aims to improve government management and decision-making by introducing the Integrated Financial Management System, Asset Management Information System and e-services for the Revenue Authority [47].

The collaboration type is public-non-profit and public-private. Structural and individual behavior are identified as positive. Contextual distances comprise: knowledge, technical, physical, resource and cultural distances. The USAID Global Development Lab executes managerial tasks. Transactions occur between individual, groups and business units. Project deliverables are both tangible – ICT infrastructure and systems, and intangible – knowledge sharing. The project is funded by the U.S.

4.5 Cross-Case Analysis

This section provides a cross analysis of the four case studies documented in Sections 4.1 to 4.4, guided by the framework from Table 1.

General: The objectives of technology transfer vary, e.g. the transfer from Estonia and Tunisia is aimed at developing legal and operational frameworks for digital government, while from Singapore to Oman at deploying technical solutions within the Omani infrastructure. All cases address the needs of developing countries or countries with low digital government maturity. Due to this, the donor's and recipient's status is unequal, and except for Singapore, all donors support innovation transfer financially. Except Singapore, all cases have explicit strategies and mission statements for international partnership in the digital government space.

Structure: The cases provide information on the legal frameworks underpinning collaboration. Korea established a comprehensive legal framework for importing its digital government technology. Semi-structured legal frameworks are provided by Estonia and the US. In each case, the collaboration is outsourced to a government subsidiary which hosts the responsibility for managerial coordination and operation. The legal frameworks influence collaboration types, institutional design, managerial tasks, roles, transactions, and trade flows between donor and recipient countries. Contextual distances include knowledge and resource distances.

Membership: Only Korea identified inclusion criteria, conditioning collaboration on shared values and willingness. Both legal framework and project type influence the membership. Two members are constant – national government and agencies. The participation of businesses and NGOs is related to the project's types and objectives. Except the US, all cases represent the public-public type of collaboration. In cases of Estonia and Korea, there is clear acclamation of trust between donor and recipient parties. In every case, donors are assessing the recipient's institutional experience to adjust operations to the recipient's institutional and organizational environment.

Operations: Each case provides group transactions. Managerial tasks are assigned to the governmental subsidiary. Strategic decision-making is assigned to government entities and operational decision-making to agency or businesses. Except Singapore, positive incentives are offered in official announcements. Funding and people flows are common. Project deliverables are tangible when the transfer concerns technical solution deployment, and intangible when the transfer concerns knowledge sharing. Trust among donors and recipients is fundamental. The transfer is not only to promote own digital solutions or industries, but also to build trust between parties. Lack of clear inclusion criteria allows for subjective selection of recipients, becoming an instrument in the donor's economic expansion towards developing countries' markets.

5 Discussion

This study provides an analysis of inter-governmental collaboration networks for digital government innovation transfer. A literature review was conducted on technology transfer, collaborative networks and inter-governmental collaboration for technology transfer. On this basis, we developed a framework that aggregates various models, concepts, definitions and factors related to such networks.

We applied this framework to develop four case studies of donor-driven networks: Estonia, Korea, Singapore and the US. The data highlights various approaches to activating, framing, mobilizing and synthesizing interactions adopted by the donors. Despite all donors establishing purposeful agencies to handle innovation transfer, only Korea offers institutional collaboration framework. None of the cases formulates exclusion membership criteria but only Korea formulates inclusion criteria. Individual recipient's behavior, particularly acclamation of trust and experience is important. All cases established public-public collaborations, except public-non-profit by the US. Each case clearly assigns roles to participants. Given the resource-type contextual distance and the donors' financial support, participant status is unequal. Two participant types are engaged – national government and agencies.

Finally, although selected donors are well-established digital government adopters, only Estonia and Republic of Korea are transparent about undertaken activities. We met substantive difficulties in accessing information on bilateral cooperation on digital government from Singapore, and minor difficulties from the US.

6 Conclusions

Inter-governmental collaborative networks illustrate the importance of partnerships in the global economy. International digital government innovation transfer projects feature effective partnerships, trustful relationships focused on common goals and risk sharing, and access to resource and benefits attained by all parties.

As such, four major points emerge from this work: 1) inter-governmental trust and collaboration in technology transfer should be supported by institutional arrangements and established organizational structures; 2) digital government collaboration open a door to building wider bilateral partnerships; 3) inter-governmental cooperation is based on inclusion criteria which are in turn based on shared values and trust; and 4) the proposed framework has proven itself as a useful research tool.

This research has some limitations. The first is small number of case studies. The second is limited data collected on the Singapore and US cases, due to the difficulties in accessing public information. The third is partial coverage of the studied phenomena, and the consequent difficulties in generalizing the findings. The fourth is that the case studies only cover asymmetric donor-recipient relationships.

Follow up research is to address these limitations and focus on institutional frameworks and their influence on the donor, recipient and network performance. We also plan to develop case studies that represent symmetric peer-peer donor-recipient relationships, more common for North-North and South-South innovation transfer.

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