

Collaborative Dynamics of Electronic Information Sharing in Government: A Systematic Literature Review

Completed Research Paper

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Abstract

Existing research on electronic information sharing (EIS) in government faces the challenge of identifying a suitable collaborative approach, and features the lack of a holistic framework to categorize research results and to provide future research suggestions. This paper systematically analyzes and traces the literature on EIS in government by using the framework by Emerson et al. (2012)'s as a lens to assess the core elements of collaborative dynamics. Findings show that existing research on EIS in government focuses on the topics of finding a suitable communication approach, consolidating long-term relationships, and on rational resource allocation arrangements among stakeholders. However, there is still a lack of governance framework to investigate processes of long-term relationship formation and their impacts on collective actions.

Keywords: collaborative dynamics; electronic information sharing; literature review

Introduction

Electronic Information sharing (EIS) refers to the exchange of program information between governments and other executive agencies (Dawes 1996). Program information mainly consists of structured information generated by governments' daily workflows and stored in electronic formats (Decman and Vintar 2013; Hodge and Anderson 2007; Lee et al. 2009). In government, EIS initiatives were initially designed to decrease communication costs among government agencies and to provide a new technological approach to deal with public crisis events, such as 9/11. Recently, EIS has been regarded as the core foundation of e-government building (Chun et al. 2011) and also as a critical enabler of government reforms (Henninger 2018; Nam 2016).

As part of the e-government building process, the nature of EIS is characterized by the interaction between technological and organizational issues (Gil-Garcia et al. 2009). On the one hand, studies on the technological issues of EIS initiatives focus on the unified information standard design and conceptual framework building (Bajaj and Ram 2003, 2007) in order to provide technical solutions for integrating and sharing government program information across institutional boundaries. On the other hand, studies also find that EIS implementation needs governments to adapt their organizational structure and institutional arrangements to provide collaborative leadership (Luna-Reyes et al. 2007a; McDaniel 2005).

In order to find out a way to best suit the collaborating government agencies in the EIS, Scholl and Klischewski (2007) developed the integration (INT), information sharing (IS) and interoperation (IOP) framework to summarize the foci and purposes, limitations and constraints, as well as processes and outcomes in the EIS initiatives. Through a qualitative study, they found that the balance of diverse stakeholders' wants and needs is the key determinant of collaborating government agencies in EIS initiatives, and that there is a need to systematize the institutional arrangement and governance framework to provide collaborative approaches in EIS (Scholl et al. 2012).

There has always been a debate about which collaborative approach is more suitable for EIS. Some studies identified that knowledge sharing and trust building (Gil-Garcia, Guler, et al. 2010; Pardo et al. 2006) are the key determinants to build collaboration between information providers and information users and that a soft approach, such as community building (Kwon et al. 2009), is the suitable way to form collaboration. In contrast, empirical studies proved that a control management approach, supplemented by the data controller, played a much more important role in undertaking collaboration in practice (Cuganesan et al. 2017). Data controllers refer to stakeholder groups who determine the purposes and means of processing information (Fedorowicz et al. 2010). The control management approach could facilitate the information integration effectively by means of pushing administrative pressure and announcing legal constraints to the information providers to share information across horizontal institutional boundaries (Yang et al. 2012). Despite this, the control management approach also creates a tight context for forming the collaboration and is easy to decrease the users' perceived benefits (Romano et al. 2010). More recently, under pressure from the increase of the number of involved agencies and the evolving networked nature of government, researchers and governments are searching for a collaborative approach to facilitate the collaboration in EIS without abuse of administrative power (Chun et al. 2011; Latham 2018)

Collaborative governance (CG) is a broader concept stemming from the public administration discipline to describe the approach of collaboration to bring public, private and other stakeholders together to engage in a collective forum as an alternative to managerial modes (Ansell and Gash 2007). According to the perspective of collaborative governance, stakeholders could form and facilitate collective action by setting common goals, building a long-term relationship and creating the ability to establish collective action. In order to map the fragmented research results of collaborative governance, Emerson et al. (2012) conceptualized the notion of collaborative governance and provided a logic model named collaborative governance regime (CGR) to distinguish the structure, process, and product of cross-boundary collaboration (Gash 2017). Therefore, this paper aims at answering the following general research question:

RQ: To facilitate collaboration in Electronic Information sharing (EIS), what aspects of relationships should be focused on?

The aims of this review are 1) to identify central elements and features of collaborative dynamics in EIS literature 2) to analyze the interaction among the components and 3) to provide suggestions for future research. In order to do so, in this paper we first present the collaborative governance regime in the theoretical framework section and then, in the methodology section, we conduct a systematic literature review to select and analyze EIS literature. In the research finding section, we tackle the research question by analyzing the features of each component and the relationships among them.

With the help of the concept of collaborative dynamics in the collaborative governance regime, this study not only expands the empirical case application field of CGR into e-government, especially for the discussion about the relationship between collaborative dynamic and outputs collaborative actions (Kossmann et al. 2016; Ma et al. 2018), but it also provide the ground for the emergence of new theoretical insights.

Theoretical Framework

The concept of collaborative governance is “the processes and structures of public policy decision making and management that engage people constructively across the boundaries of public agencies, levels of government, and/or the public, private and civic spheres in order to carry out a public purpose that could not otherwise be accomplished.” (Emerson et al. 2012, p.2).

While it is acknowledged that antecedents, process, and equity outcomes are the main elements of the collaborative governance structure (Tonelli et al. 2018), the need for building cohesion and a virtual cycle of the current terminology is still existing, especially in the context of analyzing collaborative activities (Woldesenbet 2018). Compared to the collaborative governance model proposed by Ansell and Gash (2007), Emerson et al.'s (2012) CGR not only conceptualizes its inner collaborative dynamics (CD) and collective action, but also presents some propositions among the variables within the CGR to serve as theoretical guideline for further empirical studies. Figure 1 shows the general framework of CGR.

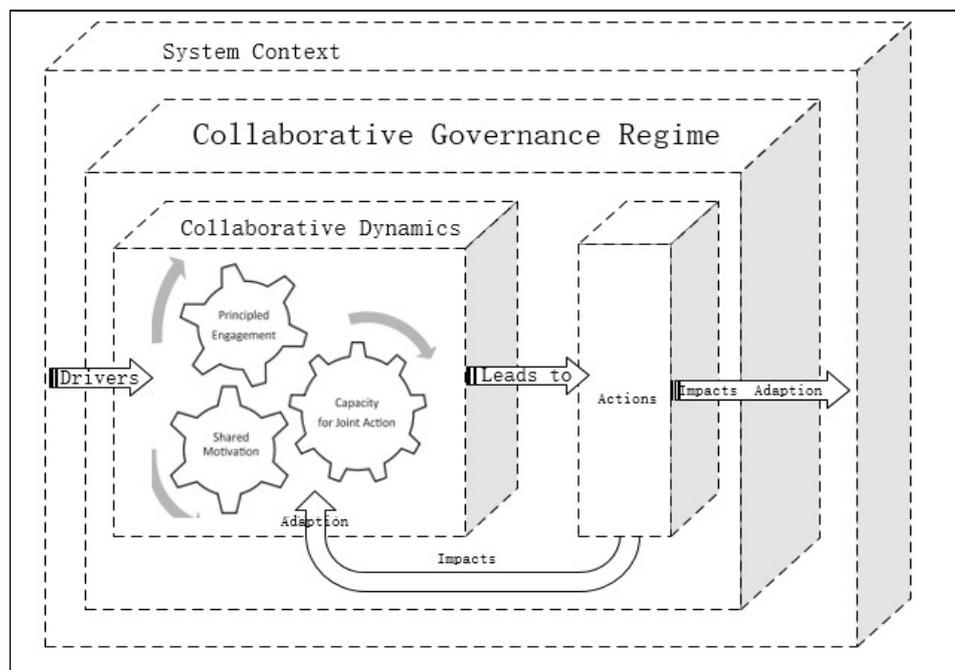


Figure 1. Collaborative Governance Regime (Emerson et al., 2012, p. 6)

Although studies focused on collaborative governance use the CGR framework as a tool to identify the challenges (Kossmann et al. 2016) and the suitable approach to achieve CG (Eldridge et al. 2018), our own interest in this paper is to apply the core components of CGR as a classificatory framework to identify the main elements of collaborative governance approach in the existing EIS literature.

In the CGR, collaborative dynamics (CD) are conceptualized to describe the interactive processes among three interactive components: principled engagement (PE), shared motivation (SM) and capacity for joint action (CJA). PE is the repeated communication process among multiple participants to indicate their wishes, needs and interests. The repeated communication process includes but is not limited to face-to-face conversation, meetings and virtual communication, in order to fully demonstrate the interests, wishes, knowledge, and participation of participants in group activities. SM is the inner drivers of the stakeholders to establish collective actions. These drivers include the improvement of the predictability of mutual behavior formed in cooperation, the establishment of mutual trust, and the improvement of the understanding ability of others, thus gradually forming internal cognitive legitimacy and a shared commitment. CJA is the ability to implement collective actions. These capabilities include procedural and institutional arrangements, the ability to create and acquire leadership, the facts and social capital needed for collaboration, and the human and material resources needed to complete the activities. Table 1 shows the core definition of collaborative dynamics.

Table 1. The Core Definition of Collaborative Dynamics in CGR

Concept	To Describe	
Collaborative Dynamics (CD)	Principled Engagement (PE)	- PE is the repeated communication process among multiple participants to indicate their wishes, needs and interests. -The process is usually comprised of the four steps of discovery, definition, deliberation, and determination.
	Shared Motivation (SM)	- SM is the inner drivers of participants to establish collective actions. - The inner foundations usually perform as mutual trust, understanding, internal legitimacy and commitment.
	Capacity for Joint Action (CJA)	- CJA is the ability to implement collective actions. - The ability comprises procedural and institutional arrangements, leadership, knowledge and resources.

Above all, the study will further discuss the interrelationships between the core components to provide corresponding interrelationships for subsequent research. In Emerson's words, the interrelationship of the three components could be summarized into three propositions:

Proposition 1: 'Repeated, quality interactions through principled engagement will help foster trust, mutual understanding, internal legitimacy, and shared commitment, thereby generating and sustaining shared motivation.'

Proposition 2: 'Once generated, shared motivation will enhance and help sustain principled engagement and vice versa in a virtuous cycle.'

Proposition 3: 'Principled engagement and shared motivation will stimulate the development of institutional arrangements, leadership, knowledge, and resources, thereby generating and sustaining capacity for joint action.'

In the above propositions, the author pays more attention to the inter-relationship between principled engagement and shared motivation, and its promotion to the capacity of joint action. In this paper, after the content analysis of the core components of collaborative dynamics in the EIS literature, we also analyzed the relationship among the three components and made a comparison with the framework to find out potential research directions.

Method

In order to study the collaborative process in EIS for finding a future research agenda, we first conducted a systematic literature review (Webster and Watson 2002) to select relevant EIS literature. Subsequently, we read the 49 selected articles regardless of its relevance to the topic of collaboration. We then classified the articles according to the classificatory framework described in the theoretical framework section; afterwards, the opinions and evidence related to the theoretical concept in the literature research results were abstracted and conducted to enrich the sub-themes (Braun and Clarke 2006). Finally, we summarized the research findings and compared the analysis results between the theoretical propositions to find potential research gaps.

Search Scope

We focused on leading journals from the fields of information systems, public administration and e-government to search for EIS literature. Table 2 illustrates the list of journals included.

Table 2. The Name List of Selected Journals

Field	List
Information Systems (n=8)	Management Information Systems Quarterly (MISQ)
	Information Systems Research (ISR)
	European Journal of Information Systems (EJIS)
	Information Systems Journal (ISJ)
	Journal of Information Technology (JIT)
	Journal of the Association for Information Systems (JAIS)
	Journal of Strategic Information Systems (JSIS)
Public Administration (n=8)	Journal of Management Information Systems (JMIS)
	Public Administration Review (PAR)
	Journal of Public Administration Research and Theory (JPART)
	Governance: An International Journal of Policy, Administration and Institutions (GaJPAI)
	Public Management Review (PMR)
	Public Administration (PA)
	International Public Management Journal (IPMJ)
E-government (n=8)	Administration & Society (AS)
	Local Government Studies (LGS)
	Government Information Quarterly (GIQ)
	Information Polity (IP)
	International Journal of Electronic Government Research (IJEGR)
	International Journal of Public Administration in the Digital Age (IJPADA)
	Transforming Government: People, Process and Policy (TGPPP)
Journal of Information Technology & Politics (JITP)	
Electronic Government, an International Journal (EGaIJ)	
Electronic Journal of Electronic Government (EJEG)	

Retrieval Method

In order to gather the relevant articles dealing with the topic of electronic information sharing in governments, we searched for the following keywords in articles' title and abstract, using the EBSCO-host and Web of Science databases: information resource(s) sharing, data sharing, information sharing, electronic information sharing and information integration. The search data included publications until October 2018.

We used the following criteria for inclusion 1) article illustrates complete research; 2) article is supported by empirical material; 3) article illustrates research in a government context. After scanning the abstract, merging the results and removing articles, we identified 46 articles. On this basis, we read the full text of 46 papers and searched for papers again by snowball sampling. Finally, the search obtained 49 articles. Figure 2 shows the search process.

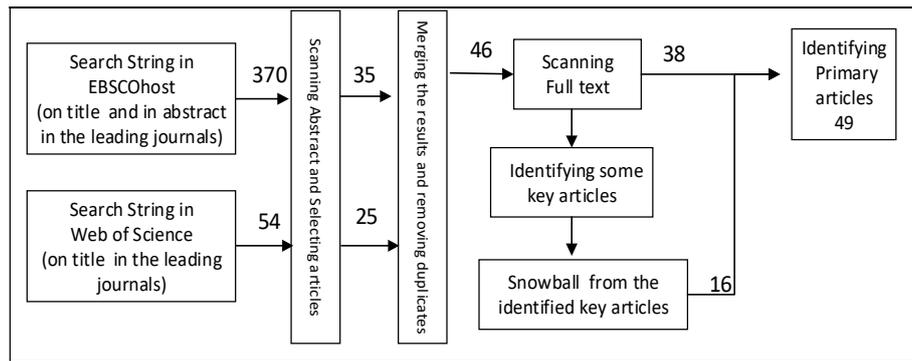


Figure 2 the Literature Selection Approach

Research Findings

Principled Engagement in EIS studies

Table 3. Concepts and Themes of Principled Engagement

Concepts	Themes	References
Principled Engagement	Complexity of PE - Professional subculture - Role behaviour characteristics	(Kolekofski and Heminger 2003) (Drake et al. 2004) (Cuganesan et al. 2017) (Anderson et al. 2017)
	Approaches of PE - Intermediary communication approach - Self-established communication approach	(Dawes 1996) (Bigdeli et al. 2013) (Ziaee Bigdeli et al. 2013) (Yang and Wu 2014)

Studies on PE tend to focus on the complexity and the approaches of PE, trying to meet the needs coming from both the stakeholders' interests and the corresponding legality requirements (Sayogo et al., 2014), thus ensuring the consistency of participants' actions (Graham et al., 2016).

Studies focusing on the complexity of PE investigate what factors influence the approach selection of PE, and how. Studies on the factors identify that professional subculture and role behaviour characteristics can influence the approach selection and formation. The different values and functions of information from the scientists, politicians and bureaucrats perspective could create a problem to the communication process (Drake et al. 2004). Moreover, the role characteristic of bureaucrats both as the coordinator and the host of the PE may form a dilemma (Kolekofski and Heminger 2003) between using the administrative pressure to form a common top-down goal or facilitating interactions among the stakeholders to improve the rationality of risk-return assessment results (Anderson et al. 2017).

Studies on approaches of PE mainly discuss how the coordination departments organize the communication process and what role they have in the PE. The first approach of PE usually occurs in the initial stage and at the horizontal level of EIS, since the choice of building a coordination department may benefit the communication among the agencies by decreasing hierarchical power pressure (Yang and Wu 2014). However, this approach also faces the challenge of how to meet and attract more stakeholders into the project building process (Bigdeli et al. 2013). The self-established communication network usually occurs at the interpersonal level and based on the tacit knowledge exchange process among the working staff (Cuganesan et al. 2017). There is an argument that neglecting long-term communication gains often results in the underestimation of the benefits of shared project implementation (Ziaee Bigdeli et al. 2013) and the self-established communication network could be regarded as a kind of supplementation of the first approach.

Shared Motivation in EIS studies**Table 4. Concepts and Themes of Shared Motivation**

Concepts	Themes	References
	Inner drivers - Creation of public value including open government and transparency	(Lips et al. 2011) (Fan and Zhao 2017) (De Tuya et al., 2017a)
Shared Motivation	Performances of inner foundations - Consolidation of trust - Protocols and contracts	(McMillen 2004) (Dantas and Seville 2006; Luna-Reyes et al. 2007b) (Ltd, nd, 2008) (Lips et al., 2011) (Bigdeil et al. 2013) (Fan et al., 2014) (McGuirk et al. 2015) (Graham et al. 2016) (Cuganesan et al. 2017)

Studies on SM investigate the inner drivers and the performance of inner foundations. Few studies focused on identifying the inner drivers, and found that the strength of government democracy reform provides a high public value, and that services such as open data enhance government transparency (Fan and Zhao 2017). The inner foundation of this kind of SM is usually manifested in the organizational reconstruction and the specific manifestations presented are closely related to the current organizational context (Lips et al. 2011). Therefore, the adjustments of organizational structure – including, but not limited to, establishing coordination institution and complementing comprehensive data governance frameworks – are the main performances of the inner foundation (De Tuya et al., 2017a).

Most studies focused on the performances of inner foundations and tried to find a suitable method to consolidate the long-term relationship. From a theoretical building perspective Bigdeil et al. (2013) conceptualized companion trust, competence trust and commitment trust to deepen the understanding of the impacts of the role and business contents on the long-term trust relationship building. Among them, the competence trust, referring to the expertise that participants have shared with other participants, often formed in the early technical building stage and forces into a kind of professional network (Cuganesan et al. 2017; Lips et al. 2011). In addition, Fan et al. (2014) also adopted the sociological notion of *guanxi* to describe and find long-term relationships in China. There is a common belief that communities of practice could be used to promote the establishment of collaborative trust relationships and to build shared communities for mutual development and collaboration (McGuirk et al. 2015).

From the practice perspective, government departments that originally had core business intersections hope to enhance cross-boundary business cooperation further. They design the protocols and contracts to record the distribution of risk and responsibility, as well as the resource allocation condition (McMillen 2004). They also design the unified operable framework to stipulate information management methods (Cuganesan et al. 2017) and specific behavioral processes (Graham et al. 2016). There is also an argument that the formal regulations could help the participants identify the shared information requirements in different project building stages (Ltd, nd, 2008) to promote collaboration among participants (Dantas and Seville 2006; Luna-Reyes et al. 2007b).

Capacity for Joint Action in EIS**Table 5. Concepts and Themes of Capacity for Joint Action**

Concept	Themes	References
CJA	Collaborative leadership ability is the ability of senior leaders to promote consensus formation and develops shared processes in coordination	(Anderson et al. 2017) (Graham et al. 2016) (Sayogo et al. 2014) (Bellamy et al. 2008) (Luna-

process	Reyes et al. 2007; Wang 2018)
Organizational adjustment ability is the ability to use policy tools to align organizational structures to promote shared participation	(Drake et al. 2004)(Fedorowicz et al. 2010)(Yang et al. 2012) (McGuirk et al. 2015)((Erna) Ruijer 2017) (Allard Scott et al. 2018)
Resource allocation ability is the ability to provide training to participants and to rationally plan the operation of information systems	(Barua et al. 2007; Welch et al. 2016) (Bellamy et al. 2008) (Cuganesan et al. 2017) (Yang et al. 2014) (Harvey and Tulloch 2006; Otjacques et al. 2007)

Studies focused on CJA in EIS identified the collaborative leadership ability, organizational adjustment ability, and resource allocation ability. Among them, collaborative leadership ability is the ability of senior leaders to promote consensus formation and develop shared processes in the coordination process. Organizational adjustment ability is the ability to use policy tools to align organizational structures to promote shared participation. Resource allocation ability is the ability to provide training to participants and to plan the operation of information systems rationally.

Specifically, collaborative leadership ability includes the ability of senior leaders to communicate and develop shared behavioral processes. In the process of sharing, formal authority, especially the persuasion of high-level management authority, helps reduce the conservative attitude of participation (Luna-Reyes et al. 2007b; Wang 2018), thereby facilitating cross-boundary collaboration in EIS (Sayogo et al. 2014). At the same time, coordination institutions or superior leaders need to have the ability to decide on priorities in shared projects and develop shared behavioral processes (Bellamy et al. 2008; Graham et al. 2016) to enhance the stability and sustainability of project operations (Anderson et al. 2017).

Organizational adjustment ability includes the establishment of coordination institutions, the maintenance of communities of practice, and the policy development ability. The ability to establish coordination institutions means building the corresponding communication and organizational coordination structure (Ruijer 2017) to ensure the linkage based on the core business of the original department (Yang et al. 2012). In addition, the CIO needs to establish corresponding procedures and protocols based on different professional subculture characteristics (McGuirk et al. 2015) and action role characteristics of participants (Fedorowicz et al. 2010) to promote the construction of professional networks (Allard Scott et al. 2018) and problem-solving (Drake et al. 2004).

Resource allocation ability includes the ability to configure human resources and ICT resources. Specifically, the coordination institutions need to provide training courses to improve the interoperability and database management techniques level of government employees (Barua et al. 2007; Welch et al. 2016), and to communicate and clarify the roles and functions in the sharing action, thus completing the human resources reservation and training (Bellamy et al. 2008; Cuganesan et al. 2017). Although local governments believe that their information systems are superior to centralized information systems (Yang et al. 2014), establishing similar data management processes and unified shared data standards will help to rationally allocate information systems resources (Harvey and Tulloch 2006; Otjacques et al. 2007).

The Relationship among PE, SM and CJA

We further identified studies focusing on the relationships among PE, SM and CJA, as illustrated in Table 7.

Table 7. the relationship among PE, SM and CJA

PE	SM	CJA
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PE	(Kolekofski and Heminger, 2003) (Lips et al. 2011) (Cuganesan et al., 2017)	(McGuirk et al. 2015)
SM		(Luna-Reyes et al. 2007b) (Welch et al. 2016)
CJA	(Scholl et al., 2012) (McGuirk et al. 2015) (Anderson et al. 2017)	

The impacts of CJA on PE

Studies focusing on the impacts of CJA on PE link the roles and impacts of institutional arrangements and leadership with the PE. The concentration level of legislative power may affect the complexity and selection of PE approaches. Accurately, the development of sharing agreements can document the communication methods, frequency and core content of participants, improve the effectiveness of communication, and promote common goals. Consensus is reached (McGuirk et al., 2015). The legally determined means of communication has a higher degree of legitimacy within the organization and contributes to the continuity of communication between participants (Scholl et al., 2012). The control leadership facilitates the PE in the initial stage of EIS and may obstacle communication in the future (Anderson et al. 2017).

The impacts of PE on SM

Studies focusing on the impact of PE on SM link the attitudes toward information sharing of stakeholders with the formation of shared motivation. The positive attitude of the stakeholders could affect the behavior of working staff and thus affect the corresponding internal consensus formed in the organization (Kolekofski and Heminger, 2003). Through active personal communication and knowledge empowerment processes, staff can help to form behavioral consensus in the sharing process (Lips et al., 2011). The establishment of continuous communication also enhances the predictability of participants' behavior, thereby further increasing the possibility of mutual trust among participants (Cuganesan et al., 2017).

The impacts of PE on CJA

The dialogue and communication process between project managers in their research can help data sharing projects to clarify the authoritative flow process in the project construction process. The community of practice could gradually change the way resources are allocated. In the process of project architecture construction, principled engagement can help managers to obtain participants' collective understanding of information, thereby enhancing shared leadership skills. In the project implementation phase, principled communication can help participants overcome risks and be able to implement discussions about content privacy and other content, and enhance the effectiveness of sharing commitments between agencies (McGuirk et al. 2015).

The impacts of SM on CJA

Luna-Reyes et al., (2007) show that the construction of a trust relationship network helps participants to express each other's real information needs and expectations. This expression itself also helps the two sides to evaluate the sharing more rationally, to participate in the risks and benefits of the process, to develop organizational arrangements that are more conducive to collaboration, and enhance the ability to coordinate actions between departments.

Discussion and Conclusions

This paper has tried to assess the collaborative dynamics in the existing EIS by identifying the main features of principled engagement, shared motivation and capacity for jointed action and their interaction. In order to do so, the framework of collaborative dynamics by Emerson et al. (2012) was adopted and used as a classificatory framework to analyze 49 articles on EIS in government systematically selected from leading journals.

The research findings show the current research conditions of principled engagement, shared motivation and capacity for joint action. However, based on the summary of the research findings, there are several issues that should be investigated and reflected upon in future research on a collaborative approach in EIS in government.

From the theoretical building perspective, firstly, there is lack of studies focusing on the impacts of SM on PE to understand long-term formal processes, especially for the service contracting process (Jing and Hu 2017) since it is a critical way to allocate risks and responsibilities. Furthermore, there is a lack of studies on the impacts of PE on CJA result in a neglect of the strength of the discursive approach (Plotnikof 2015) and in paying less attention to the change of PE approach over time. Secondly, there is a need to emphasize the role of information as a core asset and to pay attention to the impacts of the collaborative dynamics on the responsibility and accountability of information assets (Evans and Price 2014), because this is not only an essential part of the strength created by collaborative dynamics that is not fully elaborated in the current studies, but also one of the critical contents that affect the progress of the collaboration process and the entire sharing process (Gurcaylilar-Yenidogan 2017). Thirdly, there is still a need to emphasize the relationship between the cultural context and the formation of shared motivation to find out the real shared motivation, instead of the mandatory government goals.

From the empirical perspective, there is a need to adopt the process research methodology in studies on collaboration in EIS. As research findings both in principled engagement and in shared motivation show, different functions of similar leadership behaviour happen at different project stages. Future studies could separate the EIS project building process according to the project lifecycle (Tilbury 2016), or distinguish the information integration and information sharing stages (Gil-Garcia, Pardo, et al. 2010).

This study has some limitations that suggest directions for future work. First, although we collected the EIS literature in a systematic approach, the selected scope is still limited to studies written in English, which may have resulted in missing several critical articles in other languages. Second, this study only adopted the collaborative governance regime by Emerson et al. (2012) as the classificatory framework. Future research could introduce other governance frameworks such as contract governance framework (Olander et al. 2010) and the adaptive governance framework (Janssen and van der Voort 2016) as theoretical basis to find more about the adaptive ability in collaborative governance (Emerson and Gerlak 2014). Lastly, this study has not focused on the technical aspect of the collaborative approach. It would be interesting to broaden the research scope into the whole regime, and it is also possible to find a new technical way to dig out more research topics. For example, we could use social network analysis to carry out a stakeholder analysis.

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