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RESEARCH ARTICLE

E-government adoption in public administration organizations: integrating institutional theory perspective and resource-based view

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Abstract
We develop and test a theoretical model to investigate the adoption of government-to-government (G2G) information systems in public administration organizations. Specifically, this model explains how top management commitment (TMC) mediates the impact of external institutional pressures on internal organizational resource allocation, which finally leads to the adoption decision. The hypotheses were tested using survey data from public administration organizations in China. Results from partial least squares analyses suggest that coercive and normative pressures positively affect TMC, which then positively affects financial and information technology (IT) human resources in the G2G adoption process. In turn, financial and IT human resources are confirmed to positively affect the intention to adopt G2G. Surprisingly, we do not find support for our hypothesis that mimetic pressures directly influence TMC. Rather, a *post hoc* analysis implies that mimetic pressures indirectly influence TMC via the influence of coercive pressures. Our findings provide important managerial implications for public administration organizations.
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Introduction

With the development of information technology (IT), governments around the world have realized the importance of using IT to improve public service delivery to their citizens and businesses, interact openly with their constituents, and communicate efficiently within public administration organizations (Irani *et al*, 2007). Electronic government (e-government), which concerns the public administration organizations' use of IT to deliver services electronically, has recently emerged to support public governance. In terms of the diversity of stakeholders, e-government can be categorized into four types: government-to-citizens (G2C), government-to-businesses (G2B), government-to-employees (G2E), and government-to-government (G2G) (Carter & Belander, 2005). The benefits of e-government include reducing corruption, delivering more transparent and accessible public services, promoting e-democracy, and saving costs (Watson & Mundy, 2001; Huang & Bwoma, 2003; Hackney *et al*, 2007).

Despite the tremendous benefits of e-government, there is an increasing acknowledgement that e-government adoption is unbalanced across all public administration organizations (Huang, 2007). The key mechanisms that drive e-government adoption by public administration organizations have not been fully understood in extant literature (Irani *et al*, 2007; EL-Haddadeh *et al*, 2010). This gap in the literature is especially noticeable in the G2G category, which supports communication and transactions among different public administration organizations (Gil-Garcia *et al*, 2007). Examples of G2G include social security card system, electronic archive system of judgments, and armed force information systems (Realini, 2004; Chen *et al*, 2009). Most current e-government research has focused on G2C or G2B adoption (e.g., Thomas & Streib, 2003; Huang, 2007; Yao & Murphy, 2007). Few studies have investigated G2G adoptions (Moon & Norris, 2005).

The lack of understanding of G2G adoption could be due to the invisibility of G2G to the public. Compared with other e-government categories (e.g., G2B or G2C) that are accessible to the public directly, G2G services are mostly related to communications within the government system and are easily neglected by citizens and researchers. In addition, G2G adoption is difficult to observe. This lack of transparency has resulted in an insufficient understanding of the antecedents of G2G adoption. To fill this gap, we address the following research questions: (1) What are the antecedents of the intention of public administration organizations to adopt G2G? (2) How do these antecedents affect the intention of public administration organizations to adopt G2G?

The investigation of the antecedents of G2G adoption is critically important. This is because G2G interlinks all administrative levels within governments and serves as an indispensable foundation for e-government capacity building. For example, information sharing enabled by G2G offers a real opportunity for public administration organizations to share databases and make decisions based on more complete information (Dawes, 1996). Such projects improve a government's capabilities to resolve problems related to both the public and private sectors (Gil-Garcia *et al*, 2007). In this sense, the extent of G2G adoption essentially determines the performance of other e-government services, such as G2B and G2C. Understanding the factors affecting G2G adoption would not only promote more efficient communications with the government system, but also enhance the total quality of public services that governments can render.

In this study, we invoke two guiding theories: institutional theory and resource-based view (RBV) to provide an integrative view on the external and internal impetuses to G2G adoption. Institutional theory sheds light on G2G adoption by addressing the interrelationships and coordination among public administration organizations. The motives of public administration organizations extend beyond economic optimization to social justification and social obligation to their peripheral organizations (Kernaghan, 2003). For example, conformity to pressures from superior organizations is considered a momentous facet of organizational performance in heavily bureaucratic contexts (Wilson, 1989). As institutional theory emphasizes the role of external pressures on focal organizations' legitimate behaviors (DiMaggio & Powell, 1983), it affords scholars an external lens through which G2G adoption can be reasonably explained. RBV complements institutional theory by explaining how public administration organizations utilize their internal resources and capabilities to respond to external pressures and make their G2G adoption decisions (Oliver, 1997). Public administration organizations, like other private organizations, possess limited resources while confronting competition from peer organizations (Porter, 1990). RBV emphasizes the role of internal resources in influencing organizations' strategies and performances (Penrose, 1959; Barney, 1991). It provides us with an internal lens to explain G2G adoption. The internal and external lenses, if being isolated, could not represent a complete view of G2G adoption. Hence, they are synthesized in this study to provide a better understanding of how a public administration organization with a specific resource portfolio makes decisions under external pressures (Oliver, 1997; Zhang & Dhaliwal, 2009). Drawing on the two theories, this paper identifies the major external pressures for public administration organizations in G2G adoption, and then explains how external pressures affect internal resource configuration to achieve an adoption decision.

This study makes important theoretical contributions to e-government literature. While antecedents affecting the adoption of G2C or G2B have been mentioned in the literature, what is less understood is what factors affect G2G adoption and in what ways. Our study pushes the envelope of research on G2G adoption by integrating institutional theory and RBV. The current body of knowledge on G2G adoption lacks sufficient depth. Using data from 148 public administration organizations, our study further tests the empirical validity of integrating institutional theory and RBV regarding e-government adoption. Second, previous studies that attempted to integrate these two theories to explain organizational decision making have primarily regarded external pressures and internal resources as independent motives for organizations (Oliver, 1997). Our study identifies the different roles of external pressures and internal resources, as well as their relationships. It enhances our understanding of how external pressures can affect internal resource development and, in turn, the G2G adoption decision. By unfolding the underlying mechanisms, more insights of the complex process of organizational decision making are provided. In addition, this study provides managerial implications for public administration organizations.

In the next section, we review the extant research and propose hypotheses. In the following section, we describe the sample, measurements, and analytical techniques required to test the hypotheses. We then present the

results of our statistical analysis. Finally, we discuss the implications for public administration organizations and provide future research directions.

Literature review and theoretical framework

As G2G projects are aimed to improve communications and collaborations among different public administration organizations (Gil-Garcia *et al*, 2007), the decision of a focal organization to adopt G2G is vulnerable to external influences from other organizations embedded in the institutional environment (Teo *et al*, 2003). While external impetuses may bring in an initial consideration about G2G adoption, the final decision to adopt G2G, like other types of IT adoption, involves abundant inputs such as internal organizational resources (EL-Haddadeh *et al*, 2010). A comprehensive understanding of G2G adoption thus should include both external and internal perspectives. However, there is no such unified view on how these external and internal factors influence the adoption process of G2G or on the interrelations between these external and internal factors. In this study, we incorporate institutional theory and RBV to fulfill the gap (Figure 1). By doing so, we are able to not only take account of the key external and internal factors at the same time, but also provide a nuanced perspective of how external factors are linked with internal factors in the process of G2G adoption.

More specifically, institutional theory assumes that organizations are motivated to comply with external formal and informal pressures (Oliver, 1997). This theory focuses on sustaining relationship between organizations and their environments, and establishing structures guiding social behavior. Institutions, commonly known as 'rules of the game', are formally defined as the humanly devised constraints that structure human interaction (North, 1990). They are made up of formal constraints (rules, laws, and constitutions), informal constraints (norms of behavior, conventions, and codes of conduct), and the effectiveness of their enforcement (North, 1990). By enforcing formal and informal constraints, institutions help to reduce uncertainty, provide meaning, and reduce transaction costs (North, 1990; Scott, 2008). Organizations are regarded as rational actors in the web of values, norms, rules, and beliefs. They make decisions by complying with the incentive structure defined by institutions (North, 1990). Hence, institutions exert considerable influences on organizational decisions (DiMaggio & Powell, 1983), such as G2G adoption. We assert that institutional theory is preeminent in helping to explain the impacts of peripheral public administration organizations on a focal public administration organization. This is because the influences of institutional pressures are stronger in public administration organizations, due to their heavier hierarchical contexts compared with private organizations.

Furthermore, we maintain that RBV can supplement institutional theory by explaining how the mobilization of internal resources is affected by external pressures.

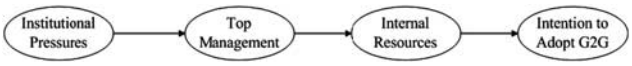

Figure 1 Conceptual framework.

While institutional theory posits that the rational choices of an organization are shaped by the external social context of the organization, RBV suggests that an organization also make rational choices that are shaped by the internal economic context of the organization (Oliver, 1997). RBV defines an organization as a bundle of productive resources (physical resources and human resources) (Penrose, 1959). It is the valuable, rare, imperfectly inimitable, and non-substitutable resources that drive organizational competitive advantages (Penrose, 1959; Barney, 1991). In this view, organizational decisions are determined by the availability of capable, experienced managers who can fully exploit underutilized resources and routines (Penrose, 1959). Drawing on RBV, we argue that institutional pressures exert their influences on G2G adoption decisions through changing internal resource allocations, a process that is anchored by the organizations' boundary spanners – top management. This is because 'external forces, no matter how strong they are, will have no effect on the behavior of an organization without first affecting the behavior of human agents within the organization' (Liang *et al*, 2007, p. 61). By sensing external pressures, top management, as the agency of key organizational members, shapes the internal capabilities and leverages available resources to make the adoption decisions.

Public administration organizations and institutional pressures

In contrast to private organizations that optimize economic profits, public administration organizations have more complex objectives and values (Moore, 1995; Kernaghan, 2003). The emphasis on departmentalization, specialization, standardization, and routinization results in a bureaucratic paradigm for public administration organizations (Weber, 1947; Simon, 1976; Schachter, 1994). Public administration organizations are required to conform to the legitimacy set by institutions to a larger extent than private organizations. Consequently, their decision to adopt G2G, which is a type of e-government that builds heavily on inter-organizational linkages (Gil-Garcia *et al*, 2007), has more to do with the institutional environment than with technological criteria.

Institutional theory has provided significant insights regarding the importance of institutional environments to initiate organizational actions, such as information system adoption (Teo *et al*, 2003). It posits that organizations face pressures to conform to shared notions of appropriate forms and behaviors, as violating them may call into question the organization's legitimacy, and thus affect its ability to secure resources and social support

(DiMaggio & Powell, 1983). Moreover, the theory has identified three types of isomorphic pressures: coercive, mimetic, and normative pressures (DiMaggio & Powell, 1983).

Coercive pressures (CP) are formal and informal pressures exerted on organizations by other organizations upon which they are dependent (DiMaggio & Powell, 1983). Complying with the requests from a dominant actor, who controls scarce and important resources, helps to secure a resource-dependent organization's own survival (Pfeffer & Salancik, 1978). These resource-dependent organizations may comply with the demands to secure their own survival. Previous studies have found that, to a focal private organization, the greater the perceived dominance of its suppliers, customers, and parent corporation, the more likely they are to adopt similar information systems (Teo *et al*, 2003).

Mimetic pressures result as organizations respond to uncertainty by mimicking the actions of other organizations. When technologies are poorly understood, when goals are ambiguous, or when the environment creates uncertainty, organizations may model themselves after other organizations that are perceived to be legitimate or successful (DiMaggio & Powell, 1983). It is empirically found that to a focal private organization, the greater the extent of information system adoption by its competitors, as well as the greater perceived success of those competitors, the more likely it will adopt similar information systems (Teo *et al*, 2003).

Normative pressures primarily occur as a result of professionalization defined as 'the collective struggle of members of an occupation to define the conditions and methods of their work, to control the production of the future member professionals, and to establish a cognitive base and legitimization for their occupational autonomy' (DiMaggio & Powell, 1983, p. 152). For private organizations, their collaboration with suppliers and customers, as well as their participation in professional associations, brings about social contagions. Moreover, interchangeable employees created through formal education and professional networks also override the variations in traditions and shape similar organizational behaviors (DiMaggio & Powell, 1983). Empirical evidence illustrates that, to a focal private organization, a greater extent of information system adoption by its suppliers and customers, and participation in associations together lead to its greater intention to adopt similar information systems (Teo *et al*, 2003).

To the best of our knowledge, institutional theory has not been applied in the context of G2G adoption by public administration organizations. We posit that, for public administration organizations, institutional pressures have significant effects on their intention to adopt G2G. Nevertheless, this process cannot be accomplished in one step. It is the external pressures that impact internal organizational capabilities and resource configuration, which in turn lead to adoption intention (AI).

Top management and resource configuration

Previous studies have suggested that in private organizations, institutional pressures need to be sensed by organizational members before they exert their effects on organizational decisions (Liang *et al*, 2007). We further articulate that the members who conduct internal and external communication are extremely important in this process. The communication mode of public administration organizations illustrates specific characteristics. The internal communication is top-down and hierarchical (Ho, 2002). Top management carries the key role that disseminates and integrates information in the organization. External communication between organizations is centralized, hierarchical, and formal (Ho, 2002). Little direct communication exists between members of two organizations unless directed by their top management. Therefore, we posit that top management acts as a key boundary spanner in public administration organizations.

Although the role of top management as a boundary spanner has also been identified in private organizations (Liang *et al*, 2007; Mitchell, 2006), we maintain that this role of top management could be amplified greatly in public administration organizations. This is because, in private organizations that promote inter-organizational communications, a boundary spanner could be anyone who has contact with or communicates with the external environment, such as top management, salespersons, and outsourcing staff. In public administration organizations, due to these organizations' hierarchical communication mode, top management becomes the only boundary spanner importing external information and integrating internal knowledge. For G2G projects, participation of top management is especially critical for forging collaboration among organizations. Furthermore, the management principle in public administration organizations – by rule and mandate – also enhances the role of top management (Ho, 2002). If we want to understand how a public administration organization responds to external pressures, top management beliefs and behaviors should not be overlooked.

In particular, the extent of the top management commitment (TMC) toward G2G adoption, to a large extent, reflects the beliefs and behaviors of the top management. Indeed, TMC means that the top management in an organization believes in and signals the importance of a technology to the organization (Lewis *et al*, 2003). This commitment has been identified as one internal organizational capability in RBV (Wade & Hulland, 2004). RBV regards an organization as a bundle of productive resources (physical and human resources) (Penrose, 1959). Organizational decisions are determined by the availability of capable, experienced managers who can fully exploit underutilized resources (Penrose, 1959). Top management support demonstrates the capability of top managers to sense external opportunities and exploit underutilized resources. By mobilizing key internal resources for G2G adoption, such as financial and IT human

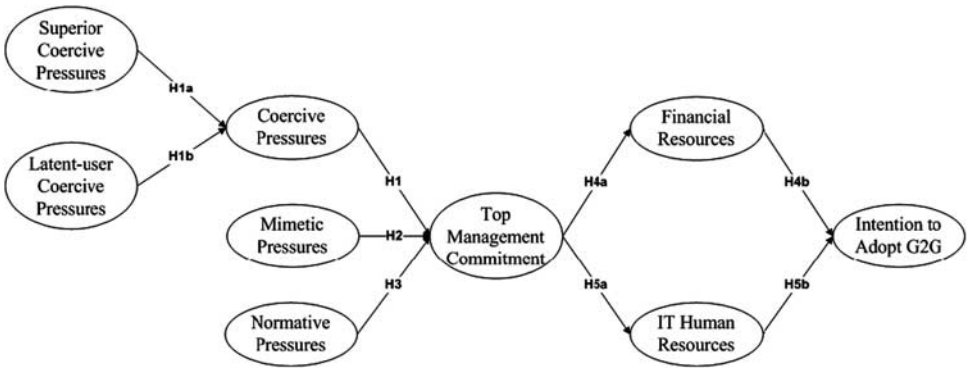

Figure 2 Research model.

resources, top management support greatly affects the organizational decisions of G2G adoption.

Research model and hypotheses

On the basis of our theoretical proposition that top management mediates the effects of institutional pressures on adoption, we develop a research model (Figure 2) and propose seven hypotheses grounded in the G2G adoption context.

CP and TMC

CP on a focal organization reflect the isomorphic pressures resulting from the organizations it depends on (DiMaggio & Powell, 1983). Previous studies have shown that CP are significant in influencing the adoption of inter-organizational information systems (Teo *et al*, 2003). In particular, for a private organization, CP from suppliers, customers, and parent corporations predict its AI (Teo *et al*, 2003).

In the context of G2G adoption in public administration organizations, we maintain that CP primarily stem from superior organizations and other upstream and downstream organizations involved in using the G2G. Public administration organizations follow the rigid management style of heavy bureaucracy governance. Subordinates are strictly required to conform to structures and practices compatible with the policies of superior organizations (Wilson, 1989). Hence, superior organizations that have adopted G2G are likely to exert pressure on subordinates to do likewise. Such CP stemming from superior organizations are called superior coercive pressures (SCPs). Top management teams in the subordinate organizations are the focal point of these SCPs. They are likely to be forced to commit to mobilizing resources to support G2G adoption.

Dependence on other upstream and downstream organizations arises when a focal organization relies heavily on other organizations for much of its input or output information. In public sectors, businesses across units and departments are usually interconnected (Gil-Garcia *et al*, 2007). Input information in one organization is often the output of other organizations. For example, in the criminal justice system, the performance of the courts depends on their coordination with law enforcement agencies and corrections offices (Cresswell & Connelly, 1999). Hence, upstream and downstream coordinators that have adopted G2G are likely to exert pressure on focal organizations to do likewise. Such CP that stem from upstream and downstream coordinators are called latent-user coercive pressures (LCPs). Similarly, these LCPs exert effects by influencing top management teams in focal organizations because external communication between organizations is hierarchical and centralized (Ho, 2002). Therefore, we propose Hypothesis 1 (H1) and its two corollaries:

H1: *The greater the coercive pressures, the higher will be the top management commitment.*

H1a: *The greater the superior coercive pressures, the higher will be the top management commitment.*

H1b: *The greater the latent-user coercive pressures, the higher will be the top management commitment.*

Mimetic pressures and TMC

Mimetic pressures on a focal organization refer to the isomorphic pressures resulting from its peer organizations (DiMaggio & Powell, 1983). To acquire status-conferring legitimacy, or social fitness, in a wider social structure, an organization usually imitates the choices made by other structurally equivalent organizations, especially successful organizations (Teo *et al*, 2003). For a private organization, mimetic pressures from its competitors significantly affect its adoption of inter-organizational information systems (Teo *et al*, 2003).

In the context of G2G adoption in public administration organizations, mimetic pressures also stem greatly from other structurally equivalent organizations (i.e., peer organizations) that have enhanced performance by implementing G2G. In the face of problems with uncertain technical solutions, top management teams may succumb to mimetic pressures from the

environment to economize on search costs, to minimize experimentation costs, or to avoid risks that are borne by first-movers (Teo *et al*, 2003). This is especially the case for public administration organizations high in risk aversion and low in entrepreneurial activities (Bozeman & Kingsley, 1998). In public administration organizations, an innovation usually is diffused from one pilot organization to others (Moore, 2005). Hence, it is highly possible that top management teams may monitor peer organizations and commit to G2G adoption after peer organizations have adopted G2G. Therefore, we propose that:

H2: *The greater the mimetic pressures, the higher will be the top management commitment.*

Normative pressures and TMC

Normative pressures on a focal organization are the isomorphic pressures resulting from professionalization (DiMaggio & Powell, 1983). These normative pressures act as a third impetus for the adoption of inter-organizational information systems (Teo *et al*, 2003). In particular, for a private organization, normative pressures from suppliers, customers, and professional associations predict its AI (Teo *et al*, 2003).

In the context of G2G adoption in public administration organizations, normative pressures occur when norms of adoption have emerged in its environment. Sharing these norms about innovation adoption through networking in public sectors facilitates consensus, which, in turn, increases the strength of these norms and their potential influence on organizational behavior (DiMaggio & Powell, 1983). These normative pressures manifest themselves through inter-organizational communications with its superior organizations, upstream and downstream coordinators, and peer organizations. Top management teams who bear these normative pressures will be more committed to a similar adoption by a higher prevalence of the adoption of G2G by all periphery organizations in the public sectors. Therefore, we propose that:

H3: *The greater the normative pressures, the higher will be the top management commitment.*

TMC, resources, and AIs

It is well established in the literature that TMC predicts IT adoption in private organizations (Wixom & Watson, 2001; Akkermans & Helden, 2002; Caldeira & Ward, 2003; Lewis *et al*, 2003). Similarly, we maintain that for public administration organizations the importance of TMC is essential, as in these organizations the authority to deploy resources is highly centralized in top management teams (Ho, 2002). Faced by external pressures, top management teams mobilize key internal resources to fulfill their commitment in adoption. Financial and IT human resources are the most vital resources within an organization in terms of IT adoption (Wade & Hulland, 2004).

A lack of financial resources has been identified as one prominent impediment for e-government adoption (Afsar *et al*, 2005; EL-Haddadeh *et al*, 2010). In public administration organizations, to ensure that sub-organizational plans are consistent with each other and fiscally feasible, the budget is centralized by top management for control and coordination (Ho, 2002). Hence, TMC predicts the readiness of financial resources, which, in turn, determines the organization's intention to adopt G2G. Therefore, we propose that:

H4a: *The higher the top management commitment, the more will be the financial resources given.*

H4b: *The more financial resources given, the greater will be the intention to adopt G2G.*

IT human resources have been identified as another main predictor of e-government adoption (Afsar *et al*, 2005). IT human resources can provide sufficient technical support to solve problems in the adoption, implementation, and assimilation of e-government (EL-Haddadeh *et al*, 2010). In public administration organizations, top management teams control the configuration and allocation of IT human resources, just as they control financial resources. Consequently, TMC ensures sufficient IT human resources, which in turn facilitates the organization's intention to adopt G2G. Therefore, we propose that:

H5a: *The higher the top management commitment, the more will be the IT human resources given.*

H5b: *The more IT human resources given, the greater will be the intention to adopt G2G.*

Methodology

The survey method was used to test the model because it provides a basis for establishing generalizability, allows reliability, and has statistical power (Dooley, 2001). China was chosen as the research context because China represents a heavily bureaucratic context that is suitable to investigate G2G adoption.

Construct operationalization

A survey instrument was developed from a comprehensive literature review (Table 1). All items were assessed using a 7-point Likert scale ranging from 1, strongly disagree, to 7, strongly agree. We adopted the measure of AI from Teo *et al* (2003) and Azjen & Fishbein (1980). It was operationalized as a reflective construct including three items. Some modifications were made to the existing scales to make them more relevant to the context of G2G adoption.

As for measures of coercive, mimetic, and normative pressures, most of the items for private organizations were too idiosyncratic for use in the G2G context. Hence,

Table 1 Variables and measurements

Variable name	*Variable type*	*Item description (1-7 Likert scale, 1 = strongly disagree, 7 = strongly agree)*	*Reference*
Adoption intention (AI)	Reflective	AI1: Our organization is contemplating to adopt G2G in a year's time AI2: If conditions permit, our organization is likely to adopt G2G within a year AI3: Our organization plans to adopt G2G in the coming year	Adapted from Azjen & Fishbein (1980); Teo *et al* (2003)
Coercive pressure (CP)	Formative	Four items for SCP Four items for LCP	Self-developed based on Teo *et al* (2003)
Superior coercive pressure (SCP)	Reflective	With regard to our superior organizations that have adopted G2G: SCP1: They support us to adopt G2G SCP2: They need us to use G2G in collaboration with them SCP3: They need us to use G2G in communication with them SCP4: They are our core supervisors in the government system	Self-developed based on Teo *et al* (2003)
Latent-user coercive pressure (LCP)	Reflective	With regard to our latent-user organizations that have adopted G2G: LCP1: They support us to adopt G2G LCP2: They need us to use G2G in collaboration with them LCP3: They need us to use G2G in communication with them LCP4: Our organization's well-being depends on them	Self-developed based on Teo *et al* (2003)
Mimetic pressure (MP)	Formative	MP1: Our peer organizations have adopted G2G to a large extent MP2: Our peer organizations that have adopted G2G have benefited greatly	Adapted from Teo *et al* (2003)
Normative pressure (NP)	Formative	NP1: Our superior organizations have adopted G2G to a large extent NP2: Our latent-user organizations have adopted G2G to a large extent NP3: Most of our latent-user organizations are inclined to use G2G	Adapted from Teo *et al* (2003)
Top management commitment (TMC)	Reflective	TMC1: Our organization is committed to a vision of using G2G in operation TMC2: Our organization is committed to supporting our efforts in using G2G in operation TMC3: Our organization strongly encourages the use of G2G in operation TMC4: Our organization will recognize our efforts in using G2G in operation TMC5: The use of G2G is important to the organization	Adopted from Lewis *et al* (2003)
Financial resources (FR)	Reflective	FR1: Our superior organizations endorse our budget for G2G adoption FR2: Our organization has enough FR to adopt G2G FR3: The FR in our organization are sufficient for using G2G	Self-developed
IT human resources (ITHR)	Reflective	ITHR1: Our internal IT staff members are available to solve any problems regarding the use of G2G within our organization ITHR2: Our internal IT staff members are contactable at any time to provide support on the use of G2G in our organization ITHR3: Our internal IT staff members are capable of solving any problems regarding the use of G2G in our organization	Adopted from Li *et al* (2005)

conceptual definitions from the literature were employed to develop items.

Drawing on DiMaggio & Powell (1983) and Teo *et al* (2003), we operationalized CP as a formative construct formed by two sub-construct: SCP and LCP. SCP was measured as a reflective construct composed of four items, and LCP was measured as a reflective construct composed of another four items.

Mimetic pressures were adapted from Teo *et al* (2003) and operationalized as a formative construct including two dimensions: perceived extent of G2G adoption by peers (MP1), and perceived success of peers that have adopted G2G (MP2). Normative pressures were operationalized as a formative construct including three dimensions: perceived extent of G2G adoption by superior organizations (NP1), perceived extent of G2G adoption by latent-user organizations (NP2), and perceived norms of using G2G by latent-user organizations (NP3).

Five items of TMC was adopted from Lewis *et al* (2003). We self-developed three items to gauge financial resources because the budget application and approval process in public administration organizations are different from private organizations. As for IT human resources, three items were adopted from Li *et al* (2005). These three variables were all operationalized as reflective constructs.

As the survey was conducted in China, all survey items were translated into Chinese. To ensure the correctness of translation, a double translation process was employed to ensure the meanings were retained in the translation. The reverse-translated version of the items in English was then compared with the original items to check if the meanings were preserved.

To ensure face validity of the questionnaire, 12 IS practitioners from different public administration organizations were invited to participate in questionnaire development. We also invited two IS faculty members to review the questionnaire and provide further feedback and comments for improvement. The suggestions from practitioners and faculty members were used to improve the face validity of the questionnaire.

We conducted a pilot study involving four top-middle level managers from different public administration organizations. We obtained their feedback on the length of the instrument, the format of the scales, and the content and ambiguity of the questions. Accordingly, we made minor changes in the wording of a few items.

Sample and data collection

The survey was conducted in 2006 and 2007. An initial sampling frame included public administration organizations listed on the Shanghai municipal government website (http://www.shbb.gov.cn/), and public administration organizations with senior executives attending a top university's MPA (Master of Public Administration) program in Shanghai. Shanghai is chosen because Shanghai exemplifies a Chinese city that has established a various set of e-government projects (Chen *et al*, 2011). We mailed out the URL link of online questionnaire and the printed version of questionnaires to these potential respondents. They could choose to response online or send the completed questionnaire back. We followed this initial distribution of our survey with one reminder letter coming a few weeks later. Altogether, 36 electronic questionnaires and 112 paper-based questionnaires were complete and eligible. *t*-tests and Mann–Whitney test were performed on the dependent variable and demographic characteristics (i.e., organization size, respondent's administrative level). Because there were no significant differences between the paper-based and electronic samples, they were combined. Thus, the total sample size was 148.

Table 2 Sample demographics ($N = 148$)

	Frequency	*Percent*
Organization size (number of employees)		
Above 200	7	4.7
100–200	20	13.5
50–99	14	9.5
Below 50	83	56.1
Missing	24	16.2
Total	148	100
Respondent's administrative level		
Director	51	34.5
Deputy Director	62	41.9
Section Chief	23	15.5
Missing	12	8.1
Total	148	100

Moreover, to test for the possibility of non-response bias, Armstrong & Overton's (1977) recommended procedure was adopted. This assumes that late respondents in a sample are similar to theoretical non-respondents. Using *t*-tests and Mann–Whitney test to compare early and late respondents on the dependent variable and demographic characteristics, no significant differences appeared between the two groups. Hence, non-response bias is not an issue in our sample.

Table 2 presents the demographic profiles of the sampled public administration organizations. Distribution of organization size shows a typical representation of small, medium, and large public administration organizations. As the Shanghai municipal government indicates, most public administration organizations in Shanghai have a relatively small size. Accordingly, 56.1% of our sampled public administration organizations had a number of employees under 50. Only 4.7% had more than 200 employees. In addition, the respondents are evenly distributed in terms of their administrative level.

Data analyses and results

Structural equation modeling was adopted for data analyses. Partial least squares (PLS), as implemented in SmartPLS (Ringle *et al*, 2005), was chosen and used

primarily because it allows latent constructs to be modeled as either formative or reflective indicators (Petter *et al*, 2007). We first examined the measurement model, which was followed by examining the structural model.

Measurement model

To validate the instruments for reflective constructs, we examined internal consistency, convergent validity, and discriminant validity (Gefen & Straub, 2005). As CP were operationalized as formative, second-level constructs formed from first-order reflective sub-constructs (i.e., SCP and LCP), we included the reflective constructs of SCP and LCP into our measurement model (Teo *et al*, 2003), rather than CP.

Internal consistency was examined using composite reliability (CR) for all reflective constructs. In PLS, CR relies on actual loadings to compute the factor scores and is a better indicator of internal consistency than Cronbach's α (Ranganathan *et al*, 2004). As shown in Table 3, the CR for all reflective constructs in the model was above the suggested threshold of 0.7 (Straub, 1989; Chin, 1998a).

Convergent validity indicates the extent to which the items of a scale that are theoretically related are also related in reality. Convergent validity measures the correlation among item measures of a given construct using different methods of measurement. Table 3 presents information about the loadings of the measures of our research model. All items for reflective constructs had significant path loadings at the 0.01 level. Moreover, as shown in Table 3, the average variance extracted (AVE) values for all the reflective constructs were above the limit of 0.50 advised by Fornell & Larcker (1981). In summary, there was evidence of convergent validity.

Testing for discriminant validity involves checking whether the items measure the construct in question or other (related) constructs. Discriminant validity was verified, as the squared root of the AVE for each construct was higher than correlations between it and all other constructs (Fornell & Larcker, 1981). Table 4 lists the results of discriminant validity testing pursuant to this method. Table 4 shows that each construct shares greater variance with its own block of measures than with the other constructs representing a different block of measures. Following Chin (1998b), we further used the cross-loading method to assess discriminant validity of the scales employed in testing our research model. The results showed that the item loadings in their corresponding columns are all higher than the loadings of the items used to measure the other constructs. Furthermore, when searching across the rows, one finds the item loadings to be higher for their corresponding constructs than for others. Therefore, our measurements of reflective constructs satisfy the two criteria for discriminant validity (Chin, 1998b).

Table 3 Psychometric of measurements

Construct	*Item*	*Weight*	*Loading*	*t-value*
AI (reflective)				
CR = 0.9163	AI1		0.8490***	18.3794
AVE = 0.7852	AI2		0.9008***	28.6304
	AI3		0.9074***	33.4840
SCP (reflective)				
CR = 0.8647	SCP1		0.8265***	14.9122
AVE = 0.6154	SCP2		0.7959***	7.5018
	SCP3		0.7437***	5.9526
	SCP4		0.7694***	7.3289
LCP (reflective)				
CR = 0.8580	LCP1		0.8303***	16.4765
AVE = 0.6023	LCP2		0.7636***	9.5210
	LCP3		0.7654***	8.4869
	LCP4		0.7422***	7.5753
MP (formative)				
CR: NA	MP1	−0.1449		0.3500
AVE: NA	MP2	1.0905***		3.4426
NP (formative)				
CR: NA	NP1	−0.2068		0.6197
AVE: NA	NP2	0.3144		0.9858
	NP3	0.8961***		3.9521
TMC (reflective)				
CR = 0.8990	TMC1		0.7865***	11.1775
AVE = 0.6406	TMC2		0.7980***	12.1637
	TMC3		0.8630***	32.3113
	TMC4		0.7626***	15.1814
	TMC5		0.7884***	20.8486
FR (reflective)				
CR = 0.8710	FR1		0.8183***	16.1110
AVE = 0.6926	FR2		0.8656***	23.9948
	FR3		0.8117***	13.7664
ITHR (reflective)				
CR = 0.8549	ITHR1		0.8635***	23.9218
AVE = 0.6631	ITHR2		0.7711***	9.1456
	ITHR3		0.8057***	8.8346
CP (formative)[a]				
CR: NA	CP_SCP	0.5136**		2.5459
AVE: NA	CP_LCP	0.6618***		3.4397

**$P<0.01$; ***$P<0.001$.

[a]CP was not added until using the latent scores of SCP and LCP as two items (i.e., CP_SCP, CP_LCP) in forming the formative, second-level construct of CP.

Table 4 Variable correlation matrix and AVE

	AI	*SCP*	*LCP*	*MP*	*NP*	*TMC*	*FR*	*ITHR*
AI	0.8861							
SCP	0.3692	0.7845						
LCP	0.4452	0.4401	0.7761					
MP	0.3158	0.3460	0.2503	N.A.				
NP	0.3016	0.4519	0.4474	0.3651	N.A.			
TMC	0.5044	0.3845	0.4260	0.3257	0.4456	0.8004		
FR	0.3993	0.3351	0.2943	0.2808	0.3802	0.3741	0.8322	
ITHR	0.3397	0.3900	0.4824	0.2872	0.4812	0.4979	0.4885	0.8143

Note: Values in diagonal cells are AVEs.

To validate the instruments for formative constructs, we followed a two-step procedure suggested by Petter *et al* (2007). In this phase, the latent scores of SCP and LCP were used as two items to form the formative, second-level construct of CP (Teo *et al*, 2003). First, in SPSS, given the objective of formative constructs is to retain the unique variance of teach measure and not just shared variance among measures, principal components analysis was applied to evaluate the reduced dimensionality of the measures (Chin, 1995). Unlike common factor analysis, where one examines the loadings listed in the rotated component matrix, in principal components analysis for formative constructs, the weights listed in the component score coefficient matrix were examined. As Table 5 shows, the bold weights for all items on their target formative constructs were larger than their weights on other constructs, except NP3. However, NP3 was still remained to retain content validity (Bollen & Lennox, 1991). Second, in PLS, most weights of items on CP, MP, and NP were significant, as Table 3 shows. Although some of the item weightings for the three formative measures were not significant, these items (MP1, NP1, and NP2) were still remained in order to retain content validity (Bollen & Lennox, 1991).

Table 5 Validity of questions

Item	*Component*		
	1	*2*	*3*
CP_SCP	0.051	0.042	**0.305**
CP_LCP	−0.308	−0.106	**0.891**
MP1	−0.078	**0.584**	−0.142
MP2	−0.202	**0.598**	0.016
NP1	**0.638**	−0.171	−0.276
NP2	**0.500**	−0.051	−0.166
NP3	**0.174**	−0.060	**0.226**

The bold weights for all items on their target formative constructs were larger than their weights on other constructs, except NP3.

Structural model

The structural model was assessed in PLS. Figure 3 presents the results of analysis with the explanatory powers and estimated path coefficients. Tests of the significance of all paths were performed using the bootstrap resampling procedure. As shown in Figure 3, most hypothesized paths in the research model were found to be statistically significant.

As predicted, the two respective corollaries of H1 were both supported (H1a: weight = 0.514, $P<0.01$; H1b: weight = 0.662, $P<0.001$; H1: path coefficient = 0.293, $P<0.05$), indicating strong support for the role of CP in affecting TMC. Therefore, H1 (including H1a, b) is supported. However, contrary to our prediction, mimetic pressures do not have a significant influence on TMC (path coefficient = 0.139, $P>0.05$). Thus, H2 is not supported. As expected, normative pressures are significantly related to TMC (path coefficient = 0.245, $P<0.05$). Therefore, H3 is supported. Overall, CP had the strongest effect on TMC, followed by normative pressures.

Also, as predicted, TMC is significantly related to the financial resources (path coefficient = 0.358, $P<0.001$) and IT human resources (path coefficient = 0.498, $P<0.001$), and these two resources in turn show significant positive relationships with AI (FR: path coefficient = 0.305, $P<0.01$; ITHR: path coefficient = 0.191, $P<0.05$). Hence, Hypotheses 4a, b and 5a, b are all supported.

Conclusion and discussions

Findings

The results demonstrate that with regard to G2G adoption the institutional pressures of public administration organizations affect their TMC, which in turn impact the internal resource allocation and finally the AI. Several decades ago when e-government application was constrained by the complexity of IT, the technology innovation and diffusion perspective was more appropriate

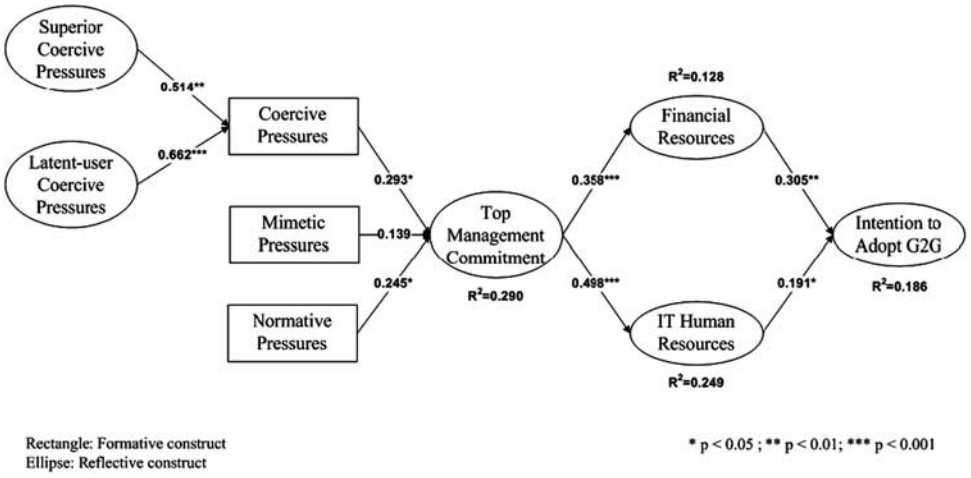

Figure 3 PLS analysis of results.

for explaining the decision process of e-government adoption (Titah & Barki, 2006). However, with the advance of IT, technology complexity is no longer a major concern for e-government adoption. Instead, inter-organizational pressures heavily influence the decisions of public administration organizations, including e-government adoption decisions. Under these circumstances, we argue that the institutional perspective is more relevant for understanding the e-government adoption process. To provide more insights, we also identified the top management teams as key boundary brokers in perceiving the external pressures and deploying the internal resources. The mediation offered by TMC is useful to explain the variability and key influential factors of e-government adoption in public administration organizations. By elaborating our research model in terms of the three distinct institutional pressures, as well as TMC, and financial and IT human resources, we offer a rich set of results.

First, we find that CP influence TMC. Moreover, when the top management teams feel a larger need of G2G usage from superior organizations and latent-user organizations, they are more committed to supporting future adoption. This result is consistent with previous studies conducted in the context of private organizations (Liang *et al*, 2007). The unique finding in our study is that it is the CP coming from superior organizations and latent-user organizations that affect TMC. The sources of CP here are different from those in the context of private organizations.

Second, normative pressures are found to influence the TMC in our study, while previous studies conducted in the context of private organizations found no support for this relationship (Liang *et al*, 2007). This inconsistency may be due to the more stringent requirements on complying with the norms for public administration organizations. In public administration organizations, the top management teams are largely affected by normative pressures from the norms of adoption that emerge in the environment.

Third, although previous studies conducted in the context of private organizations have found that mimetic pressures have significant influence on TMC (Liang *et al*, 2007), our results do not support this finding. Rather, mimetic pressures seem to have no direct impact on TMC in public administration organizations. An alternative explanation could be that the top management teams depend largely on their superior organizations in the highly hierarchical context of the Chinese government. As a result, peer pressure is not an important impetus for the top management team in a focal organization to make decisions. Even though top managers are subject to peer pressure, they are not inclined to immediately make their decisions until they are required to by their superior organizations. We examined this possibility by conducting a *post hoc* analysis. In the PLS model, we added a path from mimetic pressures to CP. The results of *post hoc* analysis showed that mimetic pressures do have a significant and positive influence on CP (path coefficient = 0.394, $P < 0.001$), while CP keep on positively affecting TMC (path coefficient = 0.284, $P < 0.05$). At the same time, the direct influence of mimetic pressures on top management remains not significant. Other parts of the model are similar as in the original one. Hence, we conclude that mimetic pressures may indirectly influence TMC via the influence of CP.

Fourth, TMC in public administration organizations is found to determine the allocation of two types of resources, IT human resources and financial resources, which in turn lead to the G2G AI. Although the key role of TMC in public administration organizations is similar to the context of private organizations (Liang *et al*, 2007), previous studies have not explicitly shown the underlying process of how top management affect internal resource configuration. Our findings shed lights on this process and also resonate well with RBV.

Theoretical contributions

First, our study is the first one to integrate institutional theory and RBV in explaining the complex process of G2G adoption by public administration organizations. Although the literature suggests integrating these two can provide a more complete picture of organizational strategy and behavior, few studies have investigated antecedents of G2G adoption from the perspectives of these two theories. Our study acts as the initial step and shows how these two perspectives could be integrated in a new way to shed light on G2G adoption. Drawing on the two theories, this paper identifies the major external pressures for public administration organizations in G2G adoption, and also explains how external pressures affect internal resource configuration to achieve an adoption decision.

Second, our study highlights the influential roles of external pressures on public administration organizations. By carefully identifying specific sources of prominent external pressures for public administration organizations, we advanced measurement for three types of pressures in the context of G2G adoption. For example, by decomposing the construct of CP into two distinct sub-constructs (SCP and LCP), we show that such decomposition helps to enrich the understanding of external pressures for public administration organizations. Moreover, we found that coercive and normative pressures largely determine a top management team's beliefs and behaviors in public administration organizations. Our study contributes to institutional theory by showing the forces that constitute prominent external pressures on public administration organizations and how these external pressures affect organizational beliefs and behavior with regard to the G2G adoption decision.

Third, we identify the top management teams as the key boundary broker that transfers external pressures into internal resource allocation and innovation adoption in public administration organizations. In the spirit of developing RBV, we show that TMC, as one important organizational capability, guides the allocation of two key

resources for G2G adoption – IT human resources and financial resources. Our study contributes to RBV by enhancing our understanding of how internal capabilities and resources lead to G2G adoption in public administration organizations.

Managerial implications

Many of our findings offer guidance toward e-government adoption and diffusion. First, the mediating role of TMC clearly highlights the significant role of the top management teams in determining G2G adoption in public administration organizations. This is why the e-government projects are always regarded as the top management leadership projects (Chen *et al*, 2009). Conversely, if top management teams lower their level of participation, the correct decision regarding G2G adoption is unlikely to happen. TMC includes making accessible official government documents, policy papers, green papers, white papers, speeches, and the encouragement of all kinds of relevant organizational social events, as well as conferences, in order to create a shared vision in public administration.

Second, as the coercive and normative mechanisms are found to be influential institutional pressures to TMC, we suggest that top management teams in public administration organizations should pay increasing intention to monitoring e-government projects implemented in their superior organizations and latent-user organizations. It helps a focal public administration organization to better integrate its operation and services with other related public administration organizations (Gil-Garcia *et al*, 2007). Of course, there are many members within a top management team, due to their limited IT knowledge, are not able to timely sense IT implementation in other organizations. Given this case, the top management members in charge of IT (e.g., IT department head) should help other members to sense the IT development in the institutional environment, and seek the commitment from other members for adopting new e-government projects.

Moreover, our finding that institutional pressures strongly influence G2G adoption is insightful for e-government consultants, vendors, and government agencies. Traditionally, consultants and vendors promote e-government projects to government agencies by demonstrating the benefits of e-government. Our findings suggest that to persuade government agencies to adopt e-government, consultants and vendors need to highlight more adoption decision and benefits from the government agencies' peripheral organizations such as superior organizations.

Third, our study also indicates that financial resources and IT human resources are important for G2G adoption. It suggests that public administration organizations need to get sufficient financial budgets and IT human resources before adopting advanced technologies. To secure more financial resources, top management teams in public administration organizations could issue financial paragraphs and reports regularly and communicate with their resources controllers frequently. To secure more IT human resources, top management teams in public administration organizations could offer more training to their IT departments. Furthermore, it is common in China that the lower-level public administration organizations tend to suffer more from resource deficiency. E-government adoption in public agencies in the countryside should pay more attention to the sustainment of the financial and IT human resources.

Limitations and future research

The results of this study must be interpreted in the context of its limitations. First, our research model was empirically tested in China, where the operations and culture of public administration organizations might differ substantially from other countries. Caution must be exercised when attempting to generalize the results across a range of organizations operating in varied contexts. Future research can be conducted to examine whether our model still holds in other countries.

Second, based on RBV, this study examined the roles of three prominent types of resources (i.e., TMC, financial resources, and IT human resources) that are the most related to G2G adoption. However, according to RBV, organizations also have other types of resources, such as organizational culture, leadership, and IT infrastructures. These resources may affect G2G adoption as well. For example, a public administration organization with a more open and innovative organizational culture might be more inclined to adopt G2G. Hence, future studies can broaden the scope of resources, and test the influences of other resources in public administration organizations.

Third, our study has developed measurements for the three institutional pressures as formative constructs. Although most weights of items for our formative constructs were significant in our sample, a few of them were non-significant. The items with non-significant weights were still kept to retain content validity. Nevertheless, we expect future studies to advance our measurements of formative constructs of the three institutional pressures.

Conclusion

How and why public administration organizations adopt G2G e-government has been largely neglected by previous research on e-government. This study is a pioneering study that has developed and tested a theoretical model to explain how institutional and resource factors influence G2G AI in public administration organizations. The research model has integrated institutional theory and RBV. It enhances our understanding of how external pressures affect internal capabilities and resources, and, in turn, the G2G adoption decision. By unfolding the underlying mechanisms and highlighting the role of TMC, it provides more insights of the complex process

of innovation adoption in public administration organizations. Besides contributing to theory development in the area of e-government adoption in particular, our study also shows clearly significant opportunities to further apply our model in G2G adoption to other e-government adoptions as well.

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