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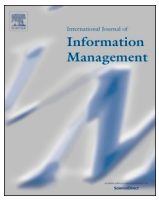

Contextual determinants of IT governance mechanism formulation for senior care services in local governments☆

Meiyun Zuo[1], Dan Ma[1], Yan Yu*,[1]

Research Institute of Smart Senior Care, School of Information, Renmin University of China, No. 59 Zhongguancun Road, Beijing, 100872, China

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ABSTRACT

Recognizing the critical role that information technology (IT) can play for the aging population, local governments tend to take responsibilities for IT-enabled senior care service delivery. Formulating IT governance mechanisms is important for governments to perform their responsibilities and maximize public value. As service arrangers, governments' actions are affected by complex external environments for legitimacy, which has been largely ignored in the existing studies. By incorporating the strategic and institutional perspectives of legitimacy into Savas's service delivery structure, this study developed a triadic framework that accounts for different contextual determinants related to the external market environment and the institutional environment to investigate the formulation of IT governance mechanisms. A survey involving 329 town-level governments in Beijing, China, was done to validate our research model. The results illustrate that the demand-supply market forces have direct impacts on IT governance mechanism formulation in local governments. Institutional pressures exert a mediating effect by transiting the supply market force into governments' actions. Our triadic framework reveals a dynamic service delivery structure, contributing to Savas's service delivery structure and IT governance research.

1. Introduction

As information technology (IT) has been widely used to support governmental administrative tasks and public service delivery (Twizeyimana & Andersson, 2019), IT is also expected to permeate senior care services, which is a critical area for most countries (Depaoli, 2013; Feng, Liu, Guan, & Mor, 2012; Obi, Ishmatova, & Iwasaki, 2013). The aging population is rapidly increasing, but there is a shortage of care service resources (Li, Wang, & Wong, 2018). In China, the demand-supply tensions have become salient, ascribed to the decrease in birth rates and the increase in life expectancy as well as to socio-economic changes (Glinskaya & Feng, 2018). Governments have vigorously advocated community-based home care services as the most important form of care for the elderly (Du & Wang, 2016), yet the service delivery is still insufficient, fragmented, and lacking supervision (Bauer, Feller, & Glinskaya, 2018; Li et al., 2018), posing new challenges for governments.

Advances in IT offer opportunities to mitigate those tensions by improving service efficiency, reducing service cost, and continuously and precisely delivering care services (Hedström, 2007). Also, IT can be an effective instrument to help governments cope with challenges by integrating service resources, enlarging service scope, and improving service access (Kapadia, Ariani, Li, & Ray, 2015; Skouby, Kivimäki, Haukiputo, Lynggaard, & Windekilde, 2014; Yang, 2013). IT-enabled senior care services are embedded in or supported by various technical artifacts, such as wearable devices, ambient assisted living, and m-health platforms for the elderly (Chiarini, Ray, Akter, Masella, & Ganz, 2013). Many creative IT-enabled senior care services have lowered the requirement of computer literacy for the elderly (e.g., interactive multimodal social robots and senior services call centers) (Feng et al., 2012; Portugal et al., 2015). Governments play a critical role in arranging IT-enabled senior care services (Kapadia et al., 2015), as they act as the stewards of senior care service delivery (Glinskaya & Feng, 2018). They are not only responsible for facilitating the elderly's access to qualified and affordable services but also for fostering and regulating the service supplying market. Hence, governments tend to formulate

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* Corresponding author.
E-mail addresses: zuomy@ruc.edu.cn (M. Zuo), 2012202515@ruc.edu.cn (D. Ma), yanyu@ruc.edu.cn (Y. Yu).

[1] Three authors contribute equally to this paper.

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appropriate IT governance mechanisms to perform their responsibilities and maximize public value (Winkler, 2013).

However, few studies have investigated why and how governments engage in IT-enabled senior care services to formulate corresponding IT governance mechanisms. First, prior research on IT-enabled senior care services are mainly from the angle of service providers and service recipients (i.e., the elderly), such as IT implementation in senior care facilities (e.g., Douglas et al., 2017), the elderly's IT adoption and use (e.g., Hoque & Sorwar, 2017), and the role of IT in the elderly's lives (e.g., Koch, 2010). Research on IT-senior care services rarely stands on the governmental view. Second, although IT governance has been intensively studied in the business context (e.g., Lunardi, Becker, & Maçada, 2009; Rasheed & Geiger, 2001; Wu, Straub, & Liang, 2015), the formulation of IT governance mechanisms in the public sectors in general and in senior care services in particular has not been examined thoroughly. Several studies investigated the IT governance for e-government projects to perform administrative service tasks (e.g., Adaba & Rusu, 2014; Qassimi & Rusu, 2015), where governments were treated as service providers rather than service arrangers. Third, the actions and behaviors of governments and other public sectors are heavily dependent on legitimacy to meet with the demands of different stakeholders in their situated external environment (Boyne, 2002; Frumkin & Galaskiewicz, 2004). Xue, Liang, and Boulton (2008) explored how internal resources and external environments affect IT governance archetypes in hospitals. But their decent case study cannot answer how different external environments differentially affect the actions and behaviors of public sectors. Hence, we attempted to investigate what contextual determinants derived from the external environment affect governments to formulate IT governance mechanisms for IT-enabled senior care services and how these different contextual determinants interact to generate influences. Nevertheless, IT governance mechanisms constituted by structures and procedures convey an important signal of legitimacy seeking (Meyer & Rowan, 1977; Suchman, 1995).

The service delivery structure proposed by Savas provides a basic framework of reference to depict the relationships among different actors in the IT-enabled senior care service delivery process. According to Savas (1978), service recipients, service providers, and service arrangers constitute a structure for public or quasi-public service delivery. While IT-enabled senior care services are mainly developed and supplied by relevant IT-enabled service providers, governments are responsible for arranging suitable services to targeted aging population. As service arrangers, governments need to develop policies and standards, foster and select the supply market, purchase appropriate services, and monitor these services to fulfill the demand of the elderly (Glinskaya & Feng, 2018; Li et al., 2018). Based on Savas's service delivery structure, the demand and supply sides (i.e., service recipients and service providers) are involved in service delivery and directly relate to governments' actions (Savas, 1978). This is in line with organizations' pursuit of strategic legitimacy (Suchman, 1995), which implies that governments may have a strategic reason to actively respond to the two-sided market forces.

It is noteworthy that organizations not only pursue strategic legitimacy to deal with the external market forces but also take actions to align with the institutional constitutive pressures in the real world (Suchman, 1995). The institutional environment surrounding an organization is substantially about legitimacy and reflects the institutional rules, norms, and regulations (Oliver, 1997). For local governments, their superior and peer governments in the institutional environment would exert institutional pressures, thus affecting their actions and behaviors (Zheng, Chen, Huang, & Zhang, 2013). Therefore, it is necessary to extend Savas's service delivery structure by accounting for the institutional perspective of legitimacy. Further, when local governments manage their relationships with the market and the situated institutional environment, the above different sources may interact in a certain way to affect governments' arrangements of IT-enabled senior care services. The forces from the demand-supply market may drive governments to learn about others' arrangements, which results in their stronger perceptions of the institutional pressures. Organizations can simultaneously have strategic and institutional perspectives of legitimacy to act or react (Dumay, Frost, & Beck, 2015; Suchman, 1995). Consequently, this study develops an integrative model that accommodates the demand-supply market forces and institutional pressures and further teases out how these contextual determinants interact.

This study is particularly developed in China, which represents an aging society with over 254 million people aged 60 or older in 2019.[2] In China, town-level governments, also known as grassroots-level governments, are responsible for arranging senior care services. They should function under superior governments' guidance (e.g., the governments at the district or city level) (Zheng et al., 2013) and may learn from peer governments, especially under the condition of technological uncertainty (Hwang & Choi, 2017). Thus, it is valuable to differentiate the institutional pressures nested in a governmental administrative system from the market forces outside of the system. Such differentiation allows us to examine how different sources of forces and pressures affect the formulation of IT governance mechanisms for senior care services in local governments. To the best of our knowledge, we are the first to propose and empirically validate a dynamic triadic senior service delivery framework in which different contextual determinants interact and affect the IT governance mechanism formulation in governments. Our research framework reconciles the impacts of the external market environment and the situated institutional environment, thereby making contributions to the research on senior care service delivery structure and IT governance in governments from two perspectives of legitimacy (i.e., strategic and institutional legitimacy).

The rest of this paper is organized as follows: we first review the literature on IT governance mechanisms, the structure of IT-enabled senior care service delivery, and the strategic and institutional perspectives of legitimacy. Then, we develop a research model to account for three types of contextual determinants and their interactions. Next, we describe our methods, followed by data analysis and results. Finally, we discuss the results and implications of this study and draw a conclusion with limitations and future work.

2. Theoretical development

2.1. IT governance mechanisms

The term "governance" refers to the structures and processes by which people in societies make decisions and share power (Lebel et al., 2006). It is formulated in multiple fields to support specific tasks or business, such as IT governance (Weill & Ross, 2004) and knowledge governance (Zhao, Zuo, & Deng, 2015). In particular, IT governance is defined as "specifying the decision rights and accountability framework to encourage desirable behaviors in the use of IT" (Weill & Ross, 2004). Effective IT governance matters to organizations for proper IT use (Lunardi et al., 2009), effective IT investment (Weill & Ross, 2004), and appropriate risk management (Alreemy, Chang, Walters, & Wills, 2016).

The implementation of IT governance requires the use of IT governance mechanisms to maintain the alignment of business and IT units (Wu et al., 2015). IT governance mechanisms generally include decision-making structures, formal processes, and relationship mechanisms (De Haes & Van Grembergen, 2005, 2009). Decision-making structures are roles and responsibilities, such as those of IT executives or IT committees. Formal processes are the processes of IT decision-making and monitoring, such as the selection process of IT-enabled service

[2] Zhang Yi: The growth rate of the population has slowed down and the level of urbanization has continued to rise. National Bureau of Statistics. http://www.stats.gov.cn/tjsj/zxfb/202001/t20200119_1723767.html/ Accessed January 22, 2020.

providers. Relationship mechanisms comprise formal and informal interactions with external stakeholders (De Haes & Van Grembergen, 2005). Structures and processes together shape the functional aspect of governance and are essential for governance mechanism design (Kezar, 2004). They often serve as the monitored proxies to reflect organizational legitimacy (Suchman, 1995). An organization with legitimated structures and procedures would be considered as the "right organization for the job" (Suchman, 1995). Thus, this study focuses on the decision-making structures and formal processes that are two kinds of fundamental components of IT governance mechanisms as well as the signals of governments' actions of arranging appropriate IT-enabled senior care services.

The existing studies on IT governance mainly address the questions of how to effectively and successfully implement IT governance in organizations and what are the patterns of IT governance structure in organizations (e.g., Alreemy et al., 2016; Xue et al., 2008). Regarding IT governance implementation, agency theory, stewardship theory, and/or stakeholder theory have been used to explore what kind of relationship between board and management, and/or between top management and departments can facilitate the successful implementation of IT governance (McGinnis, Pumphrey, Trimmer, & Wiggins, 2004; Rau, 2004; Wilkin, Campbell, & Moore, 2013). For example, from a human agency perspective, Wilkin et al. (2013) found that benign and sustained use of authority contributes to the participation of principals in IT governance processes and decision making. Also, pre-emptive stakeholder participation in the evaluation of problems with existing IT is helpful for the engagement of stakeholders in IT governance exercises (Wilkin et al., 2013). Another group of studies digs into different IT governance patterns or structures based on resource dependency theory and power perspective (e.g., Rasheed & Geiger, 2001; Xue et al., 2008). The power and resource of IT functions were found to affect the archetypes of governance structures (Rasheed & Geiger, 2001; Xue et al., 2008). To sum up, the above studies are more concerned about the inherent characteristics of an organization to ensure the implementation of IT governance mechanisms.

However, Boyne (2002) argued that public sectors are "open systems" and are easily influenced by external environments. First, various types of stakeholders are involved in IT governance and exert influences on the actions and behaviors of governments and other public sectors (Winkler, 2013). Second, governments are more socially representative, accountable, and responsive than private sectors (Jaffee, 2001). Their goals are to maximize the public value as well as political and social returns (Qassimi & Rusu, 2015; Winkler, 2013). Public sectors are more concerned about risk aversion and legitimacy (Boyne, 2002; Frumkin & Galaskiewicz, 2004). As such, external environments (e.g., the market environment and the institutional environment they reside in) that can exert important influences on IT governance should be given special consideration. Xue et al. (2008) explored the broad external environment that would influence the IT governance archetypes in hospitals by conducting multiple case studies. But their study blended different types of external environments (competitive environment, institutional environment, and access to external resources) and did not consider the interactions of these contextual determinants.

Thus, this study aims to uncover how the influences from different contextual environments affect the formulation of IT governance mechanisms for senior care services in local governments. IT-enabled senior care services are the objects of IT governance for local governments. These services are not provided directly by governments, but by third-party service providers.

2.2. Structure of IT-enabled senior care service delivery

Savas's (1978) service delivery structure offers a basic framework as a reference to depict the service delivery process of IT-enabled senior care services. This structure consists of three elements: service recipients, service providers, and service arrangers (Savas, 1978). This service delivery structure can not only be applied to senior care services but also to other public or quasi-public services such as healthcare, education, and social assistance (Savas, 1978; Shi, 2017).

Senior care services, which mainly include home care services and health care services for the elderly, are not governmental administrative tasks. These services, whether or not they contain IT elements, can be considered as quasi-public services because the supply of these services has limited inclusiveness and competitiveness (Brown & Jackson, 1985). In particular, in IT-enabled senior care service delivery, service recipients are the elderly in a specific area (sub-districts, villages, or towns) who directly receive or consume services. The service providers provide IT-enabled senior care services for the elderly. The service arrangers are local governments (e.g., town-level governments) that arrange and monitor providers of senior care services to the elderly living in the communities.

Savas's (1978) service delivery structure is essentially in line with the spirit of welfare pluralism, which postulates that government is not the only subject of welfare supply, but the market, society, and family should also actively participate in the supply (Johnson, 2014). Hence, apart from the responsibilities of understanding public needs and assessing the degree of satisfaction with the delivered services (Vigoda, 2000), governments should also take the responsibilities of regulating services, purchasing services, managing service supply, and/or promoting other organizations to provide services (Shi, 2017). On the one hand, when particular services are strongly demanded by citizens, governments will be keen on arranging the relevant service delivery (Besley & Burgess, 2002). On the other hand, similar to business-centered organizations, when the market has plenty of requested service resources, governments may have a strong incentive to take certain actions (e.g., arranging IT-enabled senior care services for the elderly) (Liang, Qi, Wei, & Chen, 2017). For instance, prior studies showed that the availability of service providers could affect the public service contracting decisions in governments (Brown, Potoski, & Van Slyke, 2006; Brudney, Fernandez, Ryu, & Wright, 2004). Accordingly, the impacts from the demand and supply sides of senior care services would drive governments to make institutional arrangements.

It is noteworthy that Savas (1978) ignored the relations among a given government and other superior and peer governments. Organizations' behaviors and actions are always influenced by other actors in the institutional environment (Scott, 1987). A government is not an exception. For example, Zheng et al. (2013) found that a government department's adoption of government-to-government (G2G) information systems is affected by its superior organization, latent users, and peer organizations. These actors exert institutional pressures on governments' behaviors and actions. Therefore, both market forces and institutional pressures affect governments' actions (McNulty & Ferlie, 2004). Sowa (2009) also pointed out that resource instability or inadequacy of nonprofit organizations, together with institutional pressures, boost collaborative service delivery with third-party service providers. Hence, we extend Savas's service delivery structure by accounting for institutional pressures and develop a triadic structure of IT-enabled senior care service delivery, as shown in Fig. 1. This triadic framework serves as a base of our research model development in Section 3.

2.3. Strategic and institutional perspectives of legitimacy

Formulation of the decision structures and processes in IT governance for IT-enabled senior care services is deemed as governments' actions for gaining legitimacy. Legitimacy is "a generalized perception or assumption that actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (Suchman, 1995, p. 574). Legitimacy theory argues that organizations should perform as society expected (Mousa & Hassan, 2015). When organizations fail to fulfill the demands of society, they would be perceived to be illegitimate (Deephouse, Bundy, Tost, &

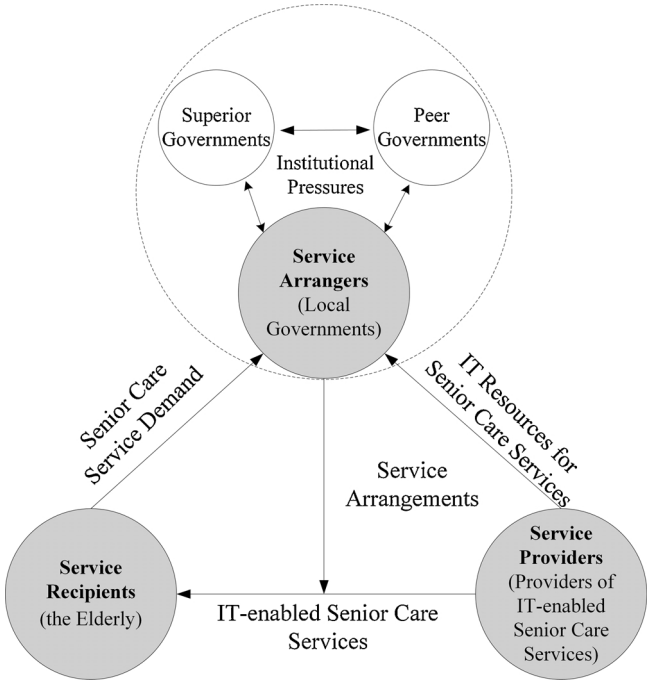

Fig. 1. A triadic framework for IT-enabled senior care service delivery.

Suchman, 2017; Mousa & Hassan, 2015). A government with higher legitimacy would get a higher degree of citizen's acceptance (Mcloughlin, 2015). Suchman (1995) further claimed that organizations "face both strategic operational challenges and institutional constitutive pressures" in the real world. Organizations try to gain both strategic legitimacy and institutional legitimacy simultaneously (Dumay et al., 2015). Regarding that governments are often in pursuit of legitimacy (Jaffee, 2001), this study tends to combine the strategic and institutional perspectives of legitimacy to explain how the contextual determinants influence the formulation of IT governance mechanisms for senior care services in local governments.

From the strategic perspective, legitimacy is an operational resource for an organization, which is as important as other resources, such as capital, technology, and personnel (Suchman, 1995; Zimmerman & Zeitz, 2002). The organizations should manage their symbolic relationships with demanding constituents (Suchman, 1995). Pragmatically, organizations can conform to demands by responding to needs and select markets by locating audiences (Zimmerman & Zeitz, 2002). In the same vein, governments, as IT-enabled senior care service arrangers, should deal with the forces from both demand and supply sides of the market for legitimacy. Formulating IT governance mechanisms can manifest the efforts of governments in IT-enabled senior care services and help them obtain the legitimacy derived from the demanding aging population and from service providers.

The institutional perspective emphasizes that legitimacy is "a set of constitutive beliefs" (Suchman, 1995), which constitute an institutional environment and exert pressures on organizations (DiMaggio & Powell, 1983). According to institutional theory, organizations often seek legitimacy and reshape legitimacy in an institutional environment, which can generate institutional pressures, including coercive, mimetic, and normative pressures (DiMaggio & Powell, 1983). Coercive pressure happens when organizations must conform to formal and informal pressures exerted by organizations they depend on or government policies (DiMaggio & Powell, 1983; Liang, Saraf, Hu, & Xue, 2007). Mimetic pressure drives organizations to respond to uncertainty by mimicking the actions of other organizations (DiMaggio & Powell, 1983). Normative pressure occurs primarily as a result of professionalization and manifests itself through trade, business, and the behaviors of other organizations. Professionalization is "the growth and elaboration of professional networks that span organizations and across which new models diffuse rapidly" (DiMaggio & Powell, 1983).

Institutional pressures may stimulate social contagion. The behaviors of actors in an institutional environment will mutually influence through interactions and observations (Abrahamson, 1991; Angst, Agarwal, Sambamurthy, & Kelley, 2010). One actor's cognition and intention can be transmitted to other actors, thereby maintaining or changing the institutional environment (Cornelissen, Durand, Fiss, Lammers, & Vaara, 2015). As such, institutional pressures can lead organizations to increasingly resemble other surrounding parties and finally lead to institutional isomorphism (Fichman, 2004). Similar to business-centered organizations, governments are also vulnerable to institutional pressures (Frumkin & Galaskiewicz, 2004). Institutional pressures exerted by the superior and peer governments will affect the governments' actions (Zheng et al., 2013).

Furthermore, governments often face both technological and demand-supply market uncertainties about IT-enabled senior care services. When there is a high strategic legitimacy for addressing the demand-supply tensions in the market, governments are inclined to learn from others, including their superior and peer governments. Thus, the local governments would be more affected by the institutional environment, which results in higher perceived institutional pressures. The institutional pressures perceived by local governments will intervene in their legitimacy perception stemming from the market to formulate appropriate IT governance mechanisms for senior care services.

3. Research model and hypotheses

We incorporate strategic and institutional perspectives of legitimacy (Suchman, 1995) into Savas's (1978) service delivery structure to propose a triadic framework (see Fig. 1), which indicates that local governments, as service arrangers, should not only interact with service recipients (i.e., the elderly) and service providers but also interact with other service arrangers (i.e., the superior and peer governments). The market forces from demand and supply sides would impel local governments to seek legitimacy strategically. Institutional pressures exerted by their superior and peer governments promote local governments to gain legitimacy institutionally. Formulating appropriate IT governance mechanisms for IT-enabled senior care services signals governments' responses to and actions on the market and institutional environments. Further, we argue that institutional pressures act as a mediator that partially transit the effects of market forces toward the formulation of IT governance mechanisms. Therefore, we develop the research model shown in Fig. 2 and further justify the hypotheses in the following subsections.

3.1. Effects of market forces

From the strategic perspective of legitimacy, organizations will "look out" to extract signals from the external market environment, and respond purposively and calculatingly (Suchman, 1995). In the context of IT-enabled senior care service, the market forces stemming from the demand side (i.e., the elderly with intensive demand) and the supply side (i.e., the available service providers) would lead local governments to have a strategic and active pursuit of legitimacy.

The primary responsibility of local governments is to arrange public goods and services in response to citizens' explicit and potential demands (Glinskaya & Feng, 2018). These responses to citizens are operational resources for governments to obtain strategic legitimacy from citizens (Lidström & Baldersheim, 2016; Suchman, 1995). Demand intensity indicates a collective level of demand for certain resources, here referring to IT-enabled senior care services. Intensive demand for public services (such as senior care services) by citizens will motivate governments to make corresponding arrangements (Sørensen & Torfing, 2011), including identifying and assessing user needs and resource

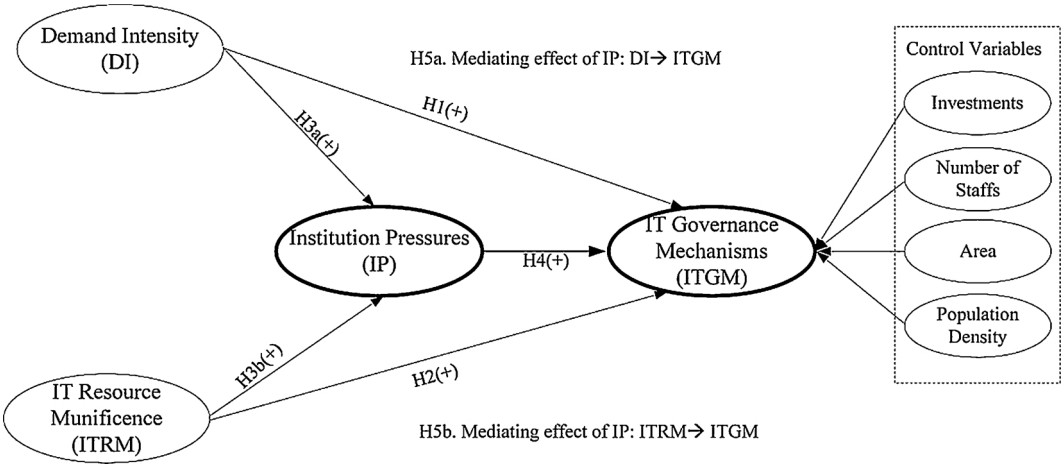

Fig. 2. Research model.

availability, as well as creating appropriate institutional arrangements (Sheaff, Pickard, & Smith, 2002).

With the rapidly rising proportion of the elderly, the demand for senior care services also increases (Jiang, Yang, & Sánchez-Barricarte, 2016). But there is a shortage of resources for delivering relevant senior care services (Du & Wang, 2016; Li et al., 2018). IT development brings opportunities for resolving the supply-shortage problem by integrating service resources, enlarging service scope, and improving service access (Kapadia et al., 2015; Skouby et al., 2014; Yang, 2013). Furthermore, the ambient assisted living technologies, senior service call centers, and multimodal interaction technologies lower the requirements of computer literacy for the elderly and make them feel free to access to IT-enabled senior care services (Chiarini et al., 2013; Feng et al., 2012; Portugal et al., 2015). Therefore, local governments with high demand intensity from the increasing aging population would have a strong desire to arrange relevant IT-enabled senior care services for the elderly to maximize public values. This further drives the governments to dedicate effort in formulating IT governance mechanisms. Accordingly, we hypothesize that

H1. *Demand intensity has a direct positive effect on the formulation of IT governance mechanisms for senior care services in a local government.*

Munificence refers to the degree to which the external market environment surrounding an organization can maintain its sustained growth (Dess & Beard, 1984). The higher the resource munificence, the easier it is for managers to persuade, negotiate, and coordinate the available resources for achieving goals (Liang et al., 2017). While access to external resources is important for organizations to take actions (Xue et al., 2008), a lack of available resources on the market may demotivate them from engaging in acquiring those resources (Ein-Dor & Segev, 1978).

Higher resource munificence indicates that more IT-enabled senior care service providers engage in senior care service delivery and a higher demand for market regulation. Although governments are not the direct service providers, citizens still recognize that governments are involved in service delivery and evaluate their legitimacy based on the service provision (Roos & Lidström, 2014). Thus, when IT-enabled senior care services are abundant, local governments would have fewer resource constraints and more access to external resources (Liang et al., 2017). Therefore, they will tend to be more active in formulating relevant IT governance mechanisms to regulate the service supplying market and ensure the service quality.

Furthermore, the requirements of social service contracts from service providers may also impel local governments to build formal structures and procedures for regulating service delivery (Zhao, Wu, & Tao, 2016). Appropriate structures and procedures can manifest the justice of the social service contracting process (Suchman, 1995) and help governments obtain the legitimacy derived from the service providers. Accordingly, we hypothesize that

H2. *IT resource munificence has a direct positive effect on the formulation of IT governance mechanisms for senior care services in a local government.*

As public sectors often operate in uncertain environments and the outputs of their actions are difficult to measure, they tend to seek external references to legitimize their actions (Frumkin & Galaskiewicz, 2004). Institutional pressures play an important role in affecting governments' actions. Abrahamson (1991) argued that institutional pressures are generated through knowledge exchange, social interactions, and the pursuit of benefits. Both demand intensity and relevant IT resource munificence potentially influence local governments' perceptions of institutional pressures surrounding them.

Currently, IT-enabled senior care services are growing in the market (Blaschke, Freddolino, & Mullen, 2009). On the one hand, there is an increasing demand for IT-enabled senior care services from the elderly, and both town and city governments have come to realize the severe lack of these services. To meet the elderly's demand, local governments will learn from others and mimic successful peer governments (Hwang & Choi, 2017), interpret the policies of superior governments, and assess the legitimacy of arranging innovative IT-enabled senior care services for the elderly.

On the other hand, service providers of IT-enabled senior care services work in a supportive or collaborative partnership with governments (Li et al., 2018). They may persuade local governments to make arrangements to support the areas they serve by demonstrating the benefits of related projects (Zheng et al., 2013). Service providers can strengthen their arguments by showing other governments' successful practices. The sales pitches of service providers can also affect the governments' attitude and perception of pressures (Jun & Weare, 2010). These indirect interactions through service providers are likely to increase the institutional pressures perceived by local governments. Consequently, we hypothesize that

H3a. *Demand intensity has a positive effect on a local government's perception of institutional pressures for arranging IT-enabled senior care services.*

H3b. *IT resource munificence has a positive effect on a local government's perception of institutional pressures for arranging IT-enabled senior care services.*

3.2. Effects of institutional pressures

From the institutional perspective of legitimacy, organizations tend

to "look in" at the society for institutional legitimacy (Suchman, 1995). The studies in the information systems area demonstrate that institutional pressures have a direct effect on IT adoption (Teo, Wei, & Benbasat, 2003), e-business transformation (Lin, Luo, & Luo, 2019), and IT governance (Xue et al., 2008). Similarly, studies about governments' actions also show that governments must comply with institutional pressures to cause their actions to be perceived to be legitimate (Frumkin & Galaskiewicz, 2004; Jun & Weare, 2010; Zheng et al., 2013). According to institutional theory, an institutional environment fosters three types of pressures, including coercive, mimetic, and normative pressures (DiMaggio & Powell, 1983).

First, regarding the restrictive hierarchical administrative system across governments at different levels in China (Zheng et al., 2013), superior governments (e.g., at the municipal level) will exert coercive pressure on lower governments. The municipal government (e.g., Beijing) has recognized the challenges of the aging population as well as the opportunities for IT development. Municipal policies encouraging the development of IT-enabled senior care services will stimulate local governments' conforming to the coercive pressure to formulate appropriate IT governance mechanisms (e.g., setting up a steering committee, appointing leaders, and creating formal processes).

Second, the mimetic pressure from governments that take the lead in introducing and monitoring IT-enabled senior care services also affects the institutional arrangements of their followers. Although governments are nonprofit organizations, they are vulnerable to achievement comparison (Overton, 2017). The performances achieved by successful governments give their followers a lively understanding of how they should act and what benefits they can obtain, and influence the followers' decisions and actions (Hwang & Choi, 2017). The pursuit of achievement may foster mimetic behavior toward the local governments that have performed good actions (e.g., arranging IT-enabled senior care services). Furthermore, imitating successful governments can help their followers acquire status-conferring legitimacy and institutional fitness (Teo et al., 2003; Zheng et al., 2013).

Third, normative pressure in the institutional environment matters to local governments. Government officers establish contacts with each other through formal channels (e.g., annual meetings and training programs) and informal channels (e.g., social media, phone, and emails). Once most of the actors in this network take certain actions, actors who do not take this action may be considered illegitimate (Zheng et al., 2013). To pursue legitimacy, other governments' arrangements for IT-enabled senior care services will influence local governments through interaction (DiMaggio & Powell, 1983; Zheng et al., 2013). Then, IT governance mechanisms are gradually formulated for IT-enabled senior care service arrangements. Having determined the above, we hypothesize that

H4. *A local government's perception of institutional pressures has a direct positive effect on its formulation of IT governance mechanisms for arranging IT-enabled senior care services.*

3.3. Mediating effects of institutional pressures

According to the two perspectives of legitimacy (Suchman, 1995), the strategic legitimacy of responding to the market forces (i.e., the demand of aging population and regulating the service supplying market) and the institutional legitimacy of complying with institution pressures would affect local governments' actions of formulating IT governance mechanisms for senior care services. Despite the above direct effects, we further argue that local governments' perceptions of pressures from the surrounding institutional environment will mediate the effects of demand-supply market forces on their IT governance mechanism formulation. After local governments "look out" at the market, they turn to "look in" at the administrative system constituted by their superior and peer governments. Seeking strategic legitimacy to satisfy the stakeholders (i.e., the elderly and the service providers) in the market motivates governments to communicate and interact with each other. Nevertheless, legitimacy management heavily relies on communication (Abrahamson, 1991; Cornelissen et al., 2015; Suchman, 1995), in our case, referring to the interactions among peer-level governments and across local-superior governments. These communications help to construct the institutional constitutive beliefs on IT governance necessity and actions for senior care services, so that governments can better achieve their strategic legitimacy goals of responding to both demand and supply sides of the market.

Specifically, we conjecture that the intensive demand from the increasing elderly population not only impels the local governments to take actions *per se* but also encourages them to interact with other governments for policies interpretation and mutual learning. In such an institutional environment, local governments can sense strong coercive and normative pressures exerted by their superior and peer governments through interactions (Cornelissen et al., 2015). Therefore, to gain institutional legitimacy, local governments tend to comply with these pressures to formulate appropriate IT governance mechanisms for senior care services.

Similarly, the resource munificence of IT-enabled senior care services in the supplying market may impel local governments to interact with others to learn how to foster and regulate this emerging and promising service market. As mentioned before, providers of IT-enabled senior care services are also active in persuading the local governments by showing successful practices in other regions (Zheng et al., 2013). Knowledge transfer via such direct and indirect interactions generates mimetic pressure (Al-Mamari, Corbitt, & Gekara, 2013). As IT resources for senior care services in the supplying market increase, local governments have a strong sense of normative pressure in the surrounding institutional environment. The superior government may also request the local governments to appropriately regulate the supplying market, generating coercive pressure. To comply with these pressures and manifest their legitimacy, local governments would formulate IT governance mechanisms for selecting appropriate service providers, evaluating the service quality, and regulating the supplying market. Accordingly, we hypothesize that

H5a. *A local government's perception of institutional pressures mediates the relationship between demand intensity and IT governance mechanism formulation.*

H5b. *A local government's perception of institutional pressures mediates the relationship between IT resource munificence and IT governance mechanism formulation.*

4. Research method

4.1. Measures

We used the survey method to test our model. For measurement development, we adapted measures that had been validated in prior research and modified them to fit the context of this study (see Appendix A). Except for the demand intensity measured by the objective population features, all other constructs were measured using a 7-point Likert scale, with 1 representing strongly disagree and 7 representing strongly agree. We designed both reflective and formative measurements for the constructs in our model. Constructs should be modeled as formative if the following conditions are met: the direction of causality is from indicators to construct, the indicators are not interchangeable, covariation among indicators is not necessary, and the nomological network (antecedents and consequences) can differ (Jarvis, MacKenzie, & Podsakoff, 2003).

Demand intensity was defined as the level of demand for IT-enabled senior care services. It may not have been appropriate to ask government officers to answer the questions, because they may not have complete information about demand. Therefore, we used population

features as proxies to measure the demand intensity, including for each town-level administrative region: (1) the percentage of the total population who were greater than or equal to 60 years old, (2) the percentage of the total elderly population who were disabled, and (3) the percentage of the population over 60 years old who were Internet users. The three items were treated as formative measures for the demand intensity. The proxy method has been used in prior research by Liang et al. (2007). Next, IT resource munificence referred to the level of IT resources available to support the senior care services in the market. Two items were adopted from the research of Sutcliffe and Huber (1998) and were treated as reflective measures.

Both institutional pressures and IT governance mechanisms were operationalized as second-order reflective–formative constructs. Institutional pressures referred to the degree of institutional pressures perceived by government officers responsible for senior care services in their jurisdictions. Institutional pressures consist of three components: coercive pressure, mimetic pressure, and normative pressure. We adapted the scales of Teo et al. (2003) and refined the measurements to ensure contextual fitness. The first-order constructs of the three components were measured by multiple reflective items, and they together formed the construct of institutional pressures. In this study, we focused on the decision-making structures and formal processes of IT governance mechanisms. To measure those components, we adapted measurements developed and validated by Wu et al. (2015). Thus, the IT governance mechanism was also operationalized as a reflective–formative construct.

We also accounted for four control variables in the model testing, including the investments in supporting senior care services by each town-level government, the number of staff members responsible for senior care services in each town-level government, the area of each town, and the population density in each town (i.e., the population per square kilometer). The first two control variables capture the investment and organization size characteristics of the internal context of a government (e.g., Cochran, 2010; Xue et al., 2008), whereas the last two control variables capture the basic characters of a region (e.g., Manoharan, 2013).

4.2. Data collection

An online survey was done in Beijing, China, where 3.33 million people over 60 years old were living in 330 towns distributed over 16,410 square kilometers. The population densities (mean = 8825 people per square kilometer, variance = 15,487) across these 330 towns are different. Beijing is also an international metropolis. Thus, Beijing is a representative city and suitable for our research data collection.

Because the survey was conducted in China, we translated the English measurements published in prior research into Chinese and asked for a group of bilingual experts to check the translation equivalence. To ensure contextual fitness, we interviewed four officers in governments and refined the questionnaire. Finally, an online structured questionnaire was prepared for large-scale data collection.

All town-level governments in the study area were involved in the survey, which was administered from August 15 to September 13, 2017. With the support of the office of the Beijing municipal aging committee, we directly distributed the link to the online questionnaire to the chief officers of senior care departments at the town level and gave a souvenir with our university's logo to each respondent. Note that the respondents' participation was voluntary, and the cover letter explicitly indicated that their responses were not related to their job performance. Finally, we collected 329 valid responses. The response rate was 99.4 %, quite likely due to the support of the Beijing municipal aging committee and material incentive.

To further assess whether the support of the Beijing municipal aging committee affected the results of the survey, a series of T-tests were conducted. We divided the respondents into positive respondents and non-positive respondents according to the response time. By referring to the non-respondents test, the late respondents are more likely to be non-respondent and less positive (Miller & Smith, 1983). We defined positive respondents (140 out of 329) as those who had filled out the questionnaire before our first reminder and non-positive respondents as those who filled out the questionnaire after the first reminder. The results of the T-tests revealed no differences between the two groups in all subjective items in the questionnaire (see Appendix A). Therefore, the support of the Beijing municipal aging committee should not influence the response quality from local governments.

5. Results

We used partial least squares (PLS) to estimate the path coefficients because our research model contained both reflective and formative constructs (Chin, 1998). Because we were interested in higher-level estimates, we used a two-stage approach to estimate the hierarchical latent variable model (Becker, Klein, & Wetzels, 2012). In the first stage, the path coefficients of the first-level model with only the first-order constructs were estimated. Institutional pressures and IT governance mechanisms were treated as second-order formative constructs and were not included in the first stage of estimation. Through the first-level model estimation, we obtained the latent variable scores of the first-order constructs. Then, we used the latent variable scores of coercive pressure, normative pressure, and mimetic pressure as the formative indicators of institutional pressures. The latent variable scores of decision-making structures and formal processes were used as the formative indicators of IT governance mechanisms (referring to Jarvis et al., 2003). In the second stage, the path coefficients in the proposed research model (see Fig. 2) were estimated along with their significant levels.

5.1. Common method bias

Our data was self-reported by the chief officers of senior care departments at the town level; therefore, common method bias may have influenced the validity of the model testing results (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Following the recommendations of Podsakoff et al. (2003), we took several precautions. First, we provided a psychological separation in the form of an introduction to clarify that our survey pursued an understanding of the present status of senior care services at the town level, but did not suggest any link to their title assessments and job performance evaluation. Second, we organized the questions by interspersing items for predictor and criterion variables, therefore counterbalancing the priming effect of the questions. Next, we did several *ad hoc* analyses. We adopted Harman's one-factor test to assess the common method variance. The result showed that the variance of the first factor was less than 50 %, and a single dominant factor could not be generated, suggesting that there was no severe common method bias in our data. Following Liang et al. (2007) and Podsakoff et al. (2003), we further relied on the single common method factor approach to assess common method bias. The result showed that the squared value of every single indicator's path coefficient from the method factor was less than 0.021, whereas the squared path coefficient from the substantive construct was above 0.60, which is significantly greater than 0.021. The results from all approaches above implied that common method bias is unlikely to have occurred.

5.2. Measurement validation

We used Smart-PLS 2.0 for data analyses. The first-level model was run to test the reliability and validity of all first-order reflective constructs. As shown in Table 1, the composite reliabilities of all first-order reflective constructs are above 0.7, indicating the measurements are reliable. The value of AVE from all these constructs is over the cutoff value of 0.5, which means that the construct explains more than half of

Table 1
Correlation, the square roots of average variance extracted and composite reliability.

Construct	DI	ITRM	CP	MP	NP	DMS	FP	Mean	SD	CR
DI	–							0.180	0.108	–
ITRM	0.041	**0.912**						4.608	0.841	0.908
CP	0.064	0.558**	**0.937**					4.948	0.783	0.935
MP	0.073	0.533**	0.740**	**0.927**				4.844	0.857	0.948
NP	0.083	0.407**	0.705**	0.793**	**0.918**			4.886	0.811	0.942
DMS	0.107	0.428**	0.452**	0.450**	0.429**	**0.942**		4.601	0.947	0.959
FP	0.076	0.473**	0.400**	0.395**	0.407**	0.841**	**0.967**	4.349	0.936	0.977

Note: a. **p < 0.01.
b. DI, demand intensity; ITRM, IT resource munificence; CP, coercive pressure; MP, mimetic pressure; NP, normative pressure; DMS, decision-making structures; FP, formal process; SD, standard deviation; CR, composite reliability.
c. Bold numbers are square roots of average extracted.

its indicators' variance (Fornell & Larcker, 1981). Convergent validity can be achieved by determining whether the indicator's outer loading on the respective construct is high enough (above 0.70) (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014). The value of outer loading implies the extent to which the indicator contributes to its construct (Afthanorhan, 2013). The results illustrate that all outer loadings for each construct are above 0.70 and significant at the 0.01 level (see Appendix A).

Discriminant validity can be assessed by determining whether the square root of AVE is higher than the correlation coefficient between the discussed construct and other constructs (Fornell & Larcker, 1981). The results in Table 1 show that all reflective constructs have good discriminant validities. Furthermore, we created a cross-loading table (see Appendix B Table B1) via factorial analysis, as implemented in SPSS 20. The values of cross loadings indicate the degree of correlation between indicators and constructs (Brown & Moore, 2012). The results show that the loading of each indicator to its associated construct is higher than that to other constructs, supporting sufficient discriminant validity among those reflective constructs.

For formative constructs (demand intensity, institutional pressures, and IT governance mechanisms), their indicators represent independent causes toward the constructs; thus high loadings of indicators are not necessary, and reliability assessments such as CR and AVE calculations do not apply (Chin, 1998). The measurement validities for formative constructs should be assessed by checking the weights of indicators and their significance level (Hair, Sarstedt, Ringle, & Mena, 2012). The weights of the indicators toward their construct imply their different contributions to the associated construct (Hair et al., 2012). Regarding institutional pressures and IT governance mechanisms were conceptualized as second-order reflective–formative constructs, the latent variable scores of their sub-dimensions were computed and used to measure the second-order constructs (Chin, Marcolin, & Newsted, 2003). Although the mimetic pressure was shown with an insignificant path toward institutional pressures, it was kept in the model testing to preserve the content validity and completeness of institutional pressures (Bollen & Lennox, 1991). Furthermore, we used SPSS 20 to check the multicollinearity among these formative constructs to ensure their reliability. The variance inflation factors (VIF) among these constructs were below the threshold of 5, suggesting a low level of multi-collinearity (Diamantopoulos, Riefler, & Roth, 2008). Table 2 shows the weights and T-values of the formative constructs' indicators.

Table 2
Weights of the formative constructs.

Construct	Indicator	Weight	T-value
Demand Intensity	PCTof60	0.533*	2.122
	PCTofDis	0.706**	2.688
	PCTofITU	0.446†	1.763
Institutional Pressures	CP	0.435*	2.633
	MP	0.154	1.209
	NP	0.504**	3.006
IT Governance Mechanisms	DMS	0.461*	2.441
	FP	0.581**	2.938

Note: a. ***p < 0.001, **p < 0.01, *p < 0.05, † p < 0.1.
b. PCTof60, the percentage of the total population who were greater than or equal to 60 years old; PCTofDis: the percentage of the total elderly population who were disabled; PCTofITU, the percentage of the population over 60 years old who were Internet users.

5.3. Hypothesis testing and mediation analysis

Fig. 3 shows the estimated values obtained from the PLS analysis. Overall, the structural model explains 39.7 % of the variance of institutional pressures and 34.9 % of the variance of IT governance mechanism formulation. The results show that the market forces that are shaped by the demand intensity and IT resources munificence have significant direct effects on the formulation of IT governance mechanisms for senior care services in local governments (β = 0.102, p < 0.05; β = 0.289, p < 0.01; respectively), supporting H1 and H2. The results also show the degree of demand intensity does not have a significant impact on the local governments' perception of institutional pressures, H3a is unsupported; while the munificence of IT resource does (β = 0.632, p < 0.01), H3b is supported. Besides, institutional pressures exert a strong direct effect on the governance actions of local governments (β = 0.331, p < 0.01). Thus, H4 is supported.

To test the mediating effect of institutional pressures, we used the bootstrapping method with 5000 samples, as suggested by Preacher and Hayes (2008). The results indicate that the indirect effect of demand intensity on the formulation of IT governance mechanisms is insignificant as its 95 % confidence interval includes zero (CI = [LLCI = −0.388, ULCI = .566]), while the institutional pressures mediate the effect of IT resource munificence on the formulation of IT governance mechanisms (β = 0.196, 95 % CI= [LLCI = 0.031, ULCI = 0.354]). Thus, H5b is supported, but H5a is not supported.

Further, we checked whether the approved mediating effect is full or partial. We followed the procedure recommended by Baron and Kenny (1986) and adopted the analysis method suggested by (Hair, Hult, Ringle, & Sarstedt, 2016), which are often used in prior studies (e.g., Cao, Duan, & Cadden, 2019; Wang, Huang, Davison, & Yang, 2018). Table 3 shows the results of the mediating effect analysis. We first estimated the direct effect of IT resource munificence on IT governance mechanism formulation without institutional pressures. It is significant (β = 0.500, p < 0.001). Then, we included the institutional pressures as a mediator into the model. The results show the direct effect of IT resource munificence on IT governance mechanism formulation is significant but much lower than before (β = 0.289, p < 0.01). Meanwhile, the effect of IT resource munificence on institutional pressures (β = 0.632, p < 0.01) and the effect of institutional pressures on IT governance mechanism formulation (β = 0.331, p < 0.01) are both significant. The indirect effect of IT resource

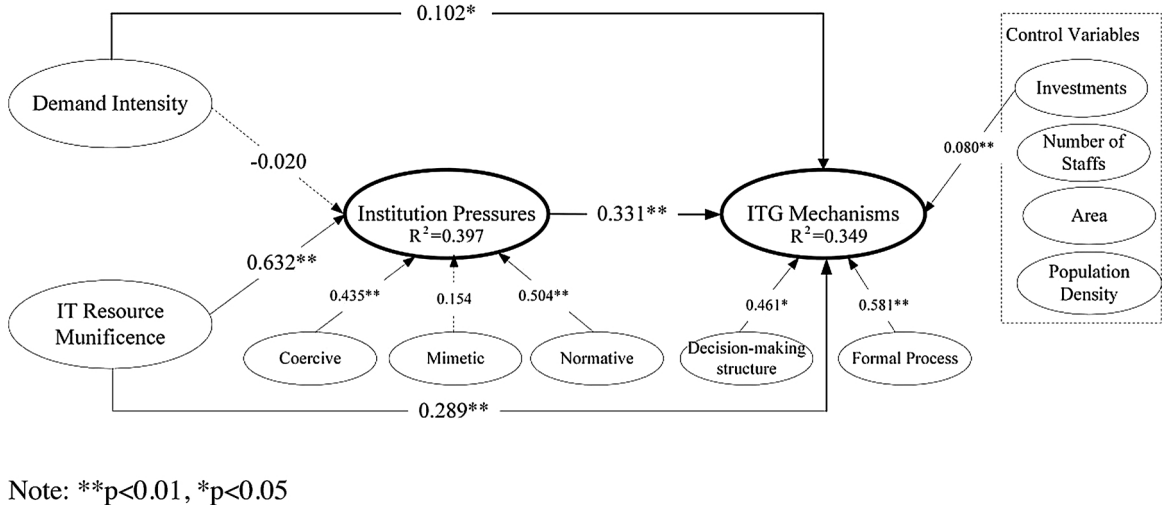

Fig. 3. Results of PLS Analysis.
Note: **p < 0.01, *p < 0.05.

munificence on IT governance mechanism formulation via institutional pressures is 0.209 (0.632 × 0.331). We also computed the variance account for (VAF) the mediating effect, as suggested by Shrout and Bolger (2002). The results are shown in Table 3. The VAF score is 0.420, which is greater than 0.20 but less than 0.80. The result indicates that institutional pressures partially mediate the relationship between IT resource munificence and IT governance mechanism formulation.

6. Discussion and implications

This study investigated the impacts of three types of contextual determinants and how they interact to influence the formulation of IT governance mechanisms for senior care services. The empirical data validates the partial mediating effect of institutional pressures between the supply-side force from IT-enabled senior care service providers and the governments' formulation of IT governance mechanisms, despite both market forces and institutional pressures exerting direct influences on governments' actions.

6.1. Key findings and discussion

We have three key findings from the structural model testing. First, the results show that the demand intensity, IT resource munificence, and institutional pressures directly affect the formulation of IT governance mechanisms in local governments. Such results consolidated the appropriateness of Savas's service delivery structure. The service recipients (i.e., the elderly), the service providers (i.e., the IT-enabled senior care service providers), and the service arrangers (i.e., the local governments), together drive the formulation of IT governance mechanisms in local governments.

Second, the results illustrate that IT resource munificence has a greater effect on IT governance mechanism formulation than demand intensity. To test the statistical difference between relationships, we used the equation of Chin et al. (2003) to compare the PLS coefficients. The difference testing shows that the aforementioned path coefficients are significantly different (t = 29.760, p < 0.001). Such results imply that the market forces of demand and supply sides exerted different impacts on the IT governance mechanism formulation. Thus, the availability of related IT resources in a market, rather than the demand from the elderly, can provide a stronger effect on local governments to formulate IT governance mechanisms for senior care services. A plausible reason is that the development of IT-enabled senior care services mainly depends on the IT-enabled service providers at present. The evolution of IT has changed the role of IT from merely supporting business processes into leading the business and services (Tanriverdi, Rai, & Venkatraman, 2010). Although local governments are responsible for arranging services to fulfill the demand of the elderly, the availability of IT-enabled senior care service providers can help governments feel confident in arranging relevant IT-enabled services. What's more, there is a low proportion of the elderly who are Internet users (15.078 % on average) in our sample, resulting in a low level of potential demand for IT-enabled senior care services. This may cause the demand intensity to have a small impact on local governments' actions related to IT-enabled senior care services. As the percentage of the population over 60 years old who are Internet users increases, the potential demand of IT-enabled senior care services can be more easily captured by local governments, and then the influence on the formulation of relevant IT governance mechanisms in local governments from the demand side is expected to be larger in the future.

Third, institutional pressures play a partial mediating effect on the relationship between IT resource munificence and IT governance mechanism formulation. However, such institutional pressures cannot intervene in the relationship between demand intensity and IT governance mechanism formulation. That may suggest that IT-enabled senior care service providers are more proactive. IT-enabled service providers may communicate with multiple local governments. When they have a successful IT-enabled service development case in one or more local governments, they tend to persuade other local governments by showing those real-life practices. The proactiveness of IT-enabled service providers may make local governments better understand the

Table 3
Results of the mediating effect analysis.

Hypothesis	Direct effect without mediation	Direct effect with mediation	Indirect effect	VAF	Mediation
H5b	0.500***	0.289**	0.209**	0.420	Partial

Note: a. ***p < 0.001, **p < 0.01, *p < 0.05.
b. VAF > 0.80, full mediation; 0.20 ≤ VAF ≤ 0.80, partial mediation; VAF < 0.20, no mediation.

situations of their peers, thus making it more likely to exert an impact on governments' actions at the network level. However, compared to service providers, elderly people are less proactive. They may have limited information about the situations of other towns. Although the demand of the elderly can directly affect local governments' actions in their region, it is not easy for them to make local governments sense the pressures exerted by other service arrangers. Consequently, the market force of the supply side is more likely to influence the local governments in the institutional environment to change and adapt (Brown et al., 2006) and ignite the institutional pressures on governments.

Furthermore, we find that coercive and normative pressures significantly contribute to the formation of institutional pressures, whereas the contribution of mimetic pressure is insignificant. This result shows the effect of the pyramid structure of the governmental administration system, where the grassroots units (town level) always receive coercive pressure from their superior governments. The significant contribution of normative pressure implies that local governments pay more attention to legitimacy when they make decisions. The insignificant contribution of mimetic pressure may be ascribed to the inadequacy of best practices and champion models among governments, or the best practices are emerging but are not commonly recognized. Nevertheless, the development of IT-enabled senior care services is still at an early stage in China.

6.2. Theoretical implications

This study entails several theoretical implications. First, this study contributes to the research on the structure of service delivery in the public sectors. It relies on Savas's service delivery structure to identify three types of drivers: service demand from the increasing proportion of the elderly, the availability of service providers, and the role of governments as service arrangers. Combining the strategic and institutional perspectives of legitimacy (Suchman, 1995), this study extends Savas's service delivery structure to propose and validate the research model in which service arrangers are not only affected by the related service recipients and providers, but also affected by the institutional pressures among service arrangers. Further, institutional pressures play a mediating role by transiting market forces toward the formulation of IT governance mechanisms in governments at the basic level. Prior research on public service delivery emphasized the direct impacts of service recipients and providers (Brown et al., 2006; Brudney et al., 2004; Savas, 1978). Our study finds that the influences of the two-sided market trigger governments to make arrangements to align the demand of the elderly and the IT-enabled senior care services supplied by third-party service providers. We also notice the institutional isomorphism among governments for institutional arrangements (DiMaggio & Powell, 1983). The market force from the supply-side not only stimulate local governments' active responses for strategic legitimacy but also induce interactions among those governments for institutional legitimacy. Therefore, this study reveals a dynamic service delivery structure, adding substantial values to Savas's service delivery structure.

Second, the uncovered dynamic service delivery structure enriches the research on legitimacy, as it accommodates two perspectives of legitimacy and approves the interaction between different contextual determinants of governments' IT governance mechanism formulation. Suchman (1995) stated that organizations should deal with both the strategic operational challenges and institutional pressures. To the best of our knowledge, research has not often empirically examined the interaction between the market environment and the institutional environment. Research by strategists and intuitionalists seems independent (Dumay et al., 2015), although not competitive. Xue et al. (2008) were aware of competitive pressures, institutional pressures, and access to external resources, but they blended these pressures into one broad external environment and generally stated the overall external environment would affect IT governance archetypes in hospitals. Our empirical study reveals that IT governance mechanism formulation in governments is the consequent action of their "looking out" at the external market for strategic legitimacy as well as their "looking in" at the surrounding institutional environment. Institutional pressures play an additional role in transiting market forces, especially the force from the IT-enabled service supply side, into governments' arrangements for IT-enabled senior care services. This disclosed that the mediating effect of institutional pressures adds value to both perspectives of legitimacy and sheds more light on the institutional theory.

Third, this study contributes to the research on IT governance in the governmental context. Previous studies of IT governance in governments focused on the role of IT in supporting administrative tasks within governments and automated administrative service delivery from governments to citizens (e.g., Adaba & Rusu, 2014; Qassimi & Rusu, 2015). This study focuses on IT governance mechanisms for IT-enabled senior care services in which more complex triadic relationships, rather than a simple government-citizen relationship, are involved. Most often, the services are not wholly hosted by the governments but are delivered by governments and third-party service providers in a collaborative manner. The objective of IT governance for senior care services is to align available IT resources from service providers with the demand of the elderly. What's more, the formulation of IT governance mechanisms for public services in the public sectors has not often been investigated in the existing literature. This study depicts the influential path of the formulation of IT governance mechanisms for new IT-enabled services (i.e., IT-enabled senior care services), adding value to IT governance research.

6.3. Managerial implications

By acknowledging the impacts of different contextual determinants of IT governance mechanism formulation in governments, this study offers important implications for public service administration. Governments at all levels should be responsible for assisting their aging constituents. Local governments may have recognized the importance of IT for senior care service delivery. Understanding the contextual effects will inform local governments how to gain legitimacy pragmatically. To achieve this goal, local governments, as service arrangers, can strategically scan the demand of service recipients, fertilize the IT-enabled senior care service market, as well as actively interact with their superior and peer governments in the institutional environment. These practices would facilitate the formulation of appropriate IT governance mechanisms for senior care services in local governments.

For superior governments, they should pay more attention to establishing an effective communication network among governments at the grassroots level. We believe this is because our results indicate that normative pressure makes the largest contribution to the formation of institutional pressures for local governments to make arrangements for senior care service delivery. Also, superior (e.g., city-level) governments should have a global vision and create farsighted policies to help implement IT-enabled senior care services in various governments at the basic level, because lower-level governments can perceive the significant coercive pressure from superior governments. Furthermore, although the effect of mimetic pressure is not supported by the current sample, previous research has emphasized its importance for governments' arrangements (Hwang & Choi, 2017). Higher-level governments need to consider fostering the culture of role models, which are useful for creating social contagion (Angst et al., 2010).

This study also implies that IT-enabled service providers should be proactive in providing IT-enabled senior care services. The availability of IT-enabled senior care services in the market is a major motivator for governments to make institutional arrangements and formulate IT governance mechanisms. The emergence and munificence of IT-enabled senior care services in the market will give governments the necessary traction to make institutional arrangements.

7. Limitations, future work, and conclusion

7.1. Limitations and future work

We are aware of three key limitations in our study that provide topics

for our future work. First, the data was collected only in Beijing, China, which is a representative city with a large number of elderly people. We invested a great deal of effort to collect data that covered almost all town-level governments in this major city. However, focusing on only one city in one country did not allow us to identify variations in situations at the city level nor the national level. Therefore, in the future, we should conduct more investigations in other cities in China to verify our results. We also expect to do research on cross-national comparisons if we have an opportunity to collect data in other countries.

Second, we measured the demand intensity by using proxy variables, which may not accurately reflect the elderly's demand for IT-enabled senior care services. For example, the percentage of the population who are Internet users, over 60 years old, and use senior care services can better reflect the actual demand for IT-enabled senior care services. Our three proxy variables reflecting the potential demand may enlarge the actual demand. However, this is the best way that we can get the closest approach to demand intensity at the moment. It is very difficult for us to call for all related IT-enabled service providers to provide more accurate information about IT-enabled senior services in use by the elderly across towns for calculation.

Third, this study focused on the formulation of IT governance mechanisms for senior care services but not the content of mechanisms. This study found out how market forces and institutional pressures interactively influence the formulation of IT governance mechanisms. However, it could not further reveal how the different compositions of resources and of the elderly (e.g., incomes and education levels) may lead governments to make different arrangements and adopt different IT governance patterns. Therefore, future work could extend this study by conducting case studies. As such, we will tease out different IT governance patterns for facilitating the alignment between the demand of the elderly and IT-enabled senior care services.

7.2. Conclusion

As IT governance mechanisms are important for local governments to engage in IT-enabled senior care services delivery, this study developed a triadic research model to investigate the contextual determinants of IT governance mechanism formulation for senior care services in local governments, based on the strategic and institutional perspectives of legitimacy and Savas's service delivery structure. We used the questionnaire data from 329 town-level governments in Beijing to test our model. The results demonstrated that the market forces from demand-supply sides and the institutional pressures both positively affect the IT governance mechanism formulation. Moreover, institutional pressures partially mediate the influence of market force from the supply-side on IT governance mechanism formulation. These results would help governments and IT-enabled senior service providers understand how to promote the local governments' actions of formulating IT governance mechanisms for senior care services.

CRediT authorship contribution statement

Meiyun Zuo: Conceptualization, Methodology, Investigation, Writing - review & editing, Project administration, Funding acquisition. **Dan Ma:** Conceptualization, Methodology, Investigation, Formal analysis, Data curation, Writing - original draft, Visualization. **Yan Yu:** Conceptualization, Methodology, Validation, Investigation, Formal analysis, Writing - review & editing, Supervision, Funding acquisition.

Appendix A. Questionnaire and indicators loading

Senior care has become a matter of concern for the whole society. IT-enabled senior care services are important in the senior care system. Thank you for agreeing to take part in this important survey for understanding the present status of IT-enabled senior care services. Be assured that all answers you provide will be kept in the strictest confidence. In addition, we promise that we will use this data reasonably.

Section 1: Basic Information

No.	Question
1	The jurisdiction area is ____km^2
2	The resident population is _____ people
3	The number of people over the age of 60 in your jurisdiction area is ___ people
4	The number of people over the age of 80 in your jurisdiction area is _____ people
5	The number of disabled elderly in your jurisdiction area is _____ people
6	The percentage of the older Internet user accounts for the elderly is ___%
7	The number of staff who are responsible for senior care services is ___ people
8	In the past year, the total investment in senior care services was ___¥

Section 2: IT Governance Mechanisms

Note: All indicators are measured using a Likert 7-level scale. 1 = Strongly Disagree; 2 = Mostly Disagree; 3 = Disagree; 4 = Neutral; 5 = Agree; 6 = Mostly Agree; 7 = Strongly Agree

Indicator	Item	Indicator Loading	T-Value
ITRM1	There are system providers who want to cooperate with us.	0.915	63.672
ITRM2	There are many senior care service systems available.	0.911	49.133
MP1	There are some town-level governments that have applied information technology to senior care services well.	0.947	109.693
MP2	The town-level governments that have applied information technology to senior care services have a good reputation.	0.928	49.651
MP3	The town-level governments that have applied information technology to senior care services have been valued and recognized by the superior offices.	0.917	31.61
NP1	Many town-level governments have applied information technology to senior care services.	0.946	76.9
NP2	Many senior care service providers have applied information technology to senior care services.	0.919	36.775
NP3	Social media often disseminate the application of information technology to senior care services.	0.91	51.079
CP1	Superior governments hope that town-level governments can apply information technology to senior care service, such as using a specific senior care service system.	0.932	67.315
CP2	The China Silver Industry Association has called for the application of information technology to senior care services.	0.918	60.471
DMS1	There is a special department in the town-level government office for IT-enabled senior care services.	0.953	86.93
DMS2	This town-level government has point leaders responsible for IT-enabled senior care services.	0.966	150.103
DMS3	The leader who is responsible for IT-enabled senior care services has a clear vision for senior care.	0.902	47.525
FP1	We have set up the goal setting and adjustment process for IT-enabled senior care services.	0.958	110.819
FP2	We have established the implementation priority evaluation process for IT-enabled senior care service projects.	0.975	172.064
FP3	We have established the budget management process for IT-enabled senior care service projects.	0.968	125.47

Appendix B. Cross loadings

See .

Table B1
Cross loadings.

Indicator[a]	Factor					
	DMS	FP	MP	NP	CP	ITRM
DMS2	.825	.425	.146	.083	.152	.147
DMS1	.802	.446	.176	.082	.143	.142
DMS3	.693	.407	.115	.240	.230	.157
FP2	.391	.843	.121	.129	.122	.218
FP3	.428	.821	.147	.091	.082	.192
FP1	.574	.707	.085	.159	.137	.202
MP1	.119	.129	.842	.304	.228	.155
MP2	.143	.096	.746	.421	.306	.190
MP3	.094	.129	.617	.271	.545	.274
NP1	.082	.188	.326	.785	.241	.190
NP2	.076	.126	.289	.729	.389	.276
NP3	.196	.013	.400	.703	.239	.311
CP2	.142	.069	.192	.338	.834	.170
CP1	.180	.116	.373	.175	.739	.306
ITRM1	.245	.053	.204	.188	.113	.867
ITRM2	−.040	.308	.083	.200	.294	.786
Variance(%)[b]	16.651	16.371	14.596	14.593	13.769	12.798

Note: a. DMS, decision-making structures; FP, formal processes; MP, Mimetic pressure; NP, normative pressure; CP, coercive pressure; ITRM, IT resource munificence.
b. Variance contribution rate after rotation.

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Meiyun Zuo is a full Professor and the director of Research Institute of Smart Senior Care and an Associate Dean of School of Information, Renmin University of China. He is also the Associate Chair of Chinese Information Economics Society (CIES) and Associate Secretary-General of China Association for Information Systems (CNAIS). His work has been published in *Journal of AIS, International Journal of Information Management*, *Internet Research, Information Technology and People,* etc. His research interests include smart senior care, IT impact on the older adults, information systems adoption, knowledge management, and etc.

Dan Ma is a PhD candidate in Research Institute of Smart Senior Care and School of Information, Renmin University of China. She received her Bachelor degree in Information Management and Information Systems from Renmin University of China. Her research interests include IT governance in government, inter-agency information sharing and smart senior care.

Yan Yu is an Associate Professor in School of Information, Renmin University of China. She received her PhD in Information Systems from City University of Hong Kong. Her research interests include smart senior care, digital innovation, and knowledge capability of organizations. She has published papers in scholarly journals, including *Journal of Business Research, Management and Organization Review, International Journal of Information Management, Information & Management,* etc. She has also published her research in the leading IS conferences.