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The Dual Drivers of Inter-Local Collaboration: A Comparative Study of Technological and Institutional Factors in China's Public Service Delivery

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ABSTRACT *While existing collaborative e-government studies rarely compare integrated service collaboration modes or their developmental pathways, this study constructs a two-dimensional typology through technological–institutional analysis. Based on the practices in the Yangtze River Delta region, it identifies three evolving modes: traditional manual, technology-driven, and synergistic governance – the latter demonstrating superior efficiency and effectiveness through deep technological–institutional integration. Moreover, local governments tend to first promote the mode through technological applications, then focus on coordinating policy standards and service delivery procedures to upgrade to the next stage.*

Keywords: technological empowerment; institutional foundation; comparative case study; e-government collaboration; inter-local public service delivery

Introduction

Governments in all bureaucratic systems are increasingly facing "tangled" problems, a broader category that includes equally challenging but more commonplace issues lying in the vast middle ground between routine and wicked problems (Dawes et al. 2009). Tangled problems often involve many interconnected issues and multiple stakeholders with different preferences and resources – for instance, the tangle of different departments and local governments involved in providing public services to migrant workers between their hometowns and work cities. These "tangled" problems are generally more amenable to problem-solving through iterative, flexible, and adaptive approaches,

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requiring intensive coordination, information sharing, and shared decision-making among diverse actors (Gasco-Hernandez et al. 2022).

Inter-local service arrangements, including joint agreements and service contracts, are considered an effective means of expanding service coverage and improving service quality. Existing literature states that inter-local collaboration in service delivery is more responsive to fiscal stress and community needs (Warner, Aldag, and Kim 2021), yields cost savings, and takes advantage of economies of scale (Bel et al. 2014; Zeemering 2019). Scholars have explored diverse influencing factors such as population, fiscal and wealth reasons, social networks and others (LeRoux and Carr 2007; Carr, LeRoux, and Shrestha 2009; LeRoux, Brandenburger, and Pandey 2010), while comparatively less attention has been paid to the role of technology in this traditional line of research. In the digital government area, utilizing technology to integrate data across organizational boundaries to provide seamless public services has become an important and widespread practice all over the world, including in the United States (Chen and Lee 2017), Canada (Boudreau and Bernier 2017), and China (Wang and Fan 2024). Such collaboration is particularly critical in fragmented administrative systems for integrating services that have been provided within individual jurisdictions but need to be unified to address the "tangled" problems of inter-local public service delivery.

Many studies argue for the importance of integration to advance e-government services (Hiller and Bélanger 2001; Andersen and Henriksen 2006; Lee 2010). The benefits of inter-organizational collaboration in information sharing and service integration have been widely acknowledged in the literature, particularly in the context of e-government, including improved service delivery, enhanced goal attainment, resource sharing, and reductions in both costs and redundancy (Dawes 1996; Dawes et al. 2009; Dedrick and Greenbaum 2011). In the last decades, a significant body of literature has emerged regarding e-government collaboration, mainly considering systems and determinants of cross-boundary information exchange and sharing (Chen and Lee 2017; Gil-Garcia et al. 2019), and also the determinants, strategies, and benefits of integrated service delivery in e-government settings (Boudreau and Bernier 2017; Juell-Skielse et al. 2017; Chen et al. 2019; Wouters et al. 2023). The e-government collaboration literature has also predominantly investigated factors that influence collaboration for information sharing or integrated service delivery from the institutional, managerial and organizational, and technological perspectives (Yang and Maxwell 2011; Gil-Garcia and Sayogo 2016; Boudreau and Bernier 2017; Chen et al. 2019; Gasco-Hernandez et al. 2022). However, existing research has not systematically explored the differentiated modes of collaborative e-government practices of inter-local public service delivery, or comparatively analyzed how different influencing factors shape the formation of these modes. At the same time, there may be a certain potential for an upgraded pathway between these modes at different stages of development. These issues warrant more in-depth and systematic research and discussion to advance our understanding of inter-local public service delivery in the digital context.

Existing literature emphasizes that both technological and institutional factors are the most critical and fundamental elements affecting e-government collaboration of information sharing and integrated service delivery (Yang and Maxwell 2011; Chen and Lee 2017; Chen et al. 2019). Specifically, technologies can enable the integration of information and services that were previously dispersed across multiple agencies and time-

consuming to assemble (Fountain 2001). A supportive institutional context – characterized by legal and policy frameworks, as well as unified standards and procedures – tends to provide the foundation for, and exert a stronger influence on, collaborative e-government practices (Luna-Reyes et al. 2007). Therefore, in this paper, I propose a two-scale typology based on the dimensions of technological and institutional factors to categorize the practical modes of e-government collaboration for inter-local public service delivery. This paper aims to answer the following research questions: *How do technological and institutional factors shape different modes of inter-local public service delivery? Specifically, what is the progression or upgrade path among these modes?* To address these research questions, this study conducts an in-depth comparative case study of inter-local public service delivery in the context of digital government development in Yangtze River Delta region of China.

The development of digital government has become a key initiative for innovating governance methods by applying digital technologies to public management and service delivery, aiming to create an inclusive, intelligent, and convenient system that minimizes citizens' physical effort while maximizing data-driven efficiency. In 2020, the central government issued the policy "The Guiding Opinions on Accelerating Inter-provincial Public Service Delivery", establishing a list of 140 high-frequency public service items to address the cross-regional service needs of the public and businesses. The policy also proposed support for regions such as Beijing–Tianjin–Hebei, the Guangdong–Hong Kong–Macao Greater Bay Area, the Yangtze River Delta, and Chengdu–Chongqing, aiming to further expand the scope and depth of inter-local public service delivery, thereby supporting regional collaboration. Since then, local governments have begun to collaborate on inter-local public service delivery through various methods, including linking digital platforms, signing collaboration agreements, and mailing materials, creating a variety of differentiated practical modes. Overall, these modes differ not only in terms of technological and institutional factors, but also in the depth and scope of collaboration, and they exhibit distinct evolutionary trajectories.

This study contributes to the literature on collaborative e-government in service delivery in two ways. First, by developing a two-dimensional typology of e-government collaboration based on technological and institutional factors, it systematically examines and compares distinct modes of inter-local public service collaboration. Second, the research explores potential evolutionary pathways between these modes across different developmental stages, while also providing empirical evidence from non-Western, non-industrialized contexts.

The remainder of this article is structured as follows. In the next section, I summarize the extant research on collaborative e-government. Then the study context and the research design are explained. Subsequently, I present and discuss the results of this study from a comparative perspective. Finally, this paper ends with a brief conclusions and policy implications.

Literature Review

Literature on Collaborative E-government

In last decades, information and communication technologies (ICT) have played an important role in facilitating inter-organizational collaborations. And these ICT-facilitated

collaboration environments for governments, referred to as collaborative e-government, might be driven by value forces, citizen forces, economic/cost forces, and technology forces (Ae Chun et al. 2012). The benefits of collaborative e-government are well known, and existing studies focus on inter-organizational collaboration for information sharing and integrated public services (Boudreau and Bernier 2017; Chen and Lee 2017; Liu and Zheng 2018; Chen et al. 2019; Puron-Cid et al. 2022; Wouters et al. 2023).

Inter-organizational Collaboration for Information Sharing. Information sharing is an important approach to increasing organizational efficiency and performance, but it is a complex task in practice. Based on existing literature, Yang and Maxwell (2011) identified three types of factors within the field of intergovernmental information sharing: organizational and managerial, technological, and political and policy. Accordingly, scholars have empirically examined the influence of various factors based on information-sharing practices in the United States. For instance, Ramon Gil-Garcia and his colleagues (2007) have investigated how some managerial and cultural impediments (e.g. control-oriented management) limit perceptions of expected benefits. Furthermore, four key factors – formally assigned project managers, availability of financial resources, interoperable standards, and compatible technical infrastructure – have been found as determinants of inter-organizational information-sharing success (Gil-Garcia and Sayogo 2016). Linking the literature of e-government, collaborative governance, and network management, some scholars tried to develop an integrated framework of collaborative data networks, to outline the interplay between context, management, collaborative dynamics, technology, and performance by conducting an in-depth case study of metropolitan planning organizations (Chen and Lee 2017).

Drawing on evidence from Latin America, scholars reveal that developing countries face challenges such as insufficient technological and human resources, underdeveloped institutional environments, and a lack of relevant content in local languages, all of which hinders the creation of significant social impact (Luna-Reyes et al. 2007). Also, some scholars have indicated how leadership influences governmental inter-organizational information sharing by studying its traits, power, behaviors, interventions, and success criteria by comparing the practices of the United States and China (Zheng et al. 2009).

Integrated Public Service Delivery. Integrated public service delivery can be viewed as a complex web of loosely coupled building blocks supported by different inter-organizational networks, expanding beyond departmental, sectoral, and territorial boundaries (Chen 2008). Wouters et al. (2023) considered integrated service delivery as a subset of digital public service delivery from different providers that have been linked together in a coherent manner in the delivery chain. Based on case studies from the Netherlands, scholars found that integrated service delivery could reduce the interactions between users and providers directly and separately, lowering the transaction costs and also the administrative burden (Van Veenstra and Janssen 2011). Inter-organizational collaboration is necessary to establish technical infrastructure and unite back-office systems for providing integrated public services in the Swedish public sector (Juell-Skielse et al. 2017). Based on a survey from Taiwan, Chen et al. (2019) found that management support, shared goals, inter-agency trust, a citizen-centric and innovative

organizational culture, and administrative interdependence have diverse impacts on the efficiency, effectiveness, and accountability of integrated service delivery.

However, advancing integrated service delivery is not easy to accomplish due to diversity of parties, inconsistent requirements, and the need for infrastructure development (Wouters et al. 2020). Based on a multiple-case study in Quebec, Canada, Boudreau and Bernier (2017) demonstrated how the diversity of administrative practices, the autonomy-seeking nature of public organizations, and cumbersome governance structures hinder the provision of online integrated services.

An Integrated Framework for Inter-Local Public Service Delivery: Technological Empowerment and Institutional Foundation

This study specifically focuses on a typical example of integrated service delivery supported by providers in different jurisdictions, that is, inter-local public service delivery. For instance, if jurisdiction A and jurisdiction B have reached an agreement to provide public service jointly, then citizens and enterprises registered in jurisdiction A could also claim corresponding public service from jurisdiction B, and vice versa. In that sense, inter-local public service delivery is supposed to be provided by at least two jurisdictions, and many jurisdictions might sometimes collaborate to deliver services. As an emerging phenomenon of collaboration in China, Wang and Fan (2024) have showed that geographical proximity, workforce similarity, administrative status asymmetry, and city mayors' personal connections are positively related to partner selection for inter-local public service delivery. But the internal process or mechanism for inter-local public service delivery seems to be a black box.

Existing literature emphasizes that both technological and institutional factors are critical to e-government collaboration of information sharing and integrated service delivery (Yang and Maxwell 2011; Chen and Lee 2017; Chen et al. 2019). However, there has been little deliberation on how institutional and technological factors shape different collaboration modes for inter-local public service delivery, especially from a comparative perspective. This paper tries to contribute to existing literature on e-government collaboration by investigating and comparing distinct collaboration modes through the lenses of technological empowerment and institutional foundations. Additionally, it explores potential upgrade pathways between these modes across different stages of development.

Technological empowerment refers to the extent to which local governments apply technologies and enhance technological compatibility and interoperability to facilitate inter-organizational information sharing and integrated public service delivery. Existing literature has stated that the growing role of technology in government is central to e-government collaboration, and these technological determinants typically involve data definitions and formats, interoperable standards, and the availability of technical infrastructure (Yang and Maxwell 2011; Yang and Wu 2015; Gil-Garcia and Sayogo 2016; Welch et al. 2016). Data are the building blocks of information interoperability and analytics for inter-local public service delivery, thus technological empowerment requires the unify of data definitions and formats, metadata, and the use of algorithms (Gil-Garcia and Pardo 2005; McDermott 2010). Furthermore, achieving interoperability requires standardization of infrastructure and information systems, and also the operational

procedures within different systems (Yang and Maxwell 2011; Pardo et al. 2012). Establishing a centralized information system can enhance the technical infrastructure and capabilities of various participating organizations and individuals, thereby facilitating information sharing across organizational boundaries (Chen and Lee 2017).

Institutional foundation refers to the extent to which local governments contribute efforts to launch supportive legal and policy frameworks, and unify standards and procedures of inter-local public service delivery. The institutional context of legal, regulatory, and policy frameworks could be seen as a basic condition for inter-organizational information sharing and collaboration (Yang and Maxwell 2011). Inter-local public service delivery involves complex decisions and interactions that are constrained by institutional arrangements, which simultaneously frame how these constraints operate (Fountain 2001). Compared with technological factors, institutional arrangements exert stronger influences on information sharing and integration initiatives, and institutional challenges seem to be more complicated (Luna-Reyes et al. 2007). In that sense, inter-local collaboration in the e-government setting needs institutional foundations of legal and policy regulations, and administrative rules to enhance institutional legitimacy and facilitate information sharing across organizational boundaries (Dawes et al. 2009; Chen and Lee 2017).

Legal and policy regulations can affect inter-organizational information sharing and integrated service delivery by creating governance conditions for data and information protection, facilitating relationship building, risk reduction, and trust development (Gil-Garcia and Pardo 2005; Ramon Gil-Garcia et al. 2007; Sanderson et al. 2015). Support from legislatures and policymakers could enhance the status of cross-boundary information sharing and service delivery in the public sector, and also provide necessary funding and resources to make projects sustainable (Zhang et al. 2005). Furthermore, local governments have their respective operational procedures and work flows, which increases the difficulty of information sharing and integrated service delivery (Canestraro et al. 2009). Coordinating and unifying public service delivery policies or standards across different jurisdictions is crucial for local stakeholders, as it decreases transaction costs and reduces potential risks associated with inter-local collaboration.

Case Selection: Inter-Local Public Service Delivery in Yangtze River Delta

Qualitative study is often focused on particular individuals, events, and contexts (Gerring 2017), and this method is particularly useful in the theory development process because it is able to provide detailed description of a phenomenon as it occurs in context (Nowell and Albrecht 2019). It is argued that qualitative research can make a significant contribution to causal analysis (Brady 2010), shedding light on what works, where, and why, while also generating new hypotheses through the examination of complex causal pathways. In that sense, this research is based on a qualitative case study aiming to address "how" and "why" questions (Yin 2003).

Given the complexity of interacting dynamics, this research employs the comparative case study method aiming to address how the technological and institutional factors shape different practical modes of inter-local public service delivery. I empirically studied inter-local public service delivery in Yangtze River Delta

region. Yangtze River Delta is an economically developed region, containing one municipality directly under the central government, Shanghai, and three provinces – Zhejiang, Jiangsu, and Anhui. In 2020, the total resident population was 235 million, accounting for 16.65 per cent of the whole country. According to data of the National Bureau of Statistics, the region reached a GDP of 24.47 trillion yuan, and has become one of the wealthiest regions in China. Based on data from the China Statistical Yearbook, the proportion of inter-provincial migrants in this region increased from 64.4 per cent in 2010 to 71.7 per cent in 2017.[1] Moreover, according to the "Yangtze River Delta Regional Collaborative Innovation Index 2023", as of September 2023 there were 5,389 cross-regional investments among listed companies within the Yangtze River Delta region, spanning the three provinces and one municipality.[2] Shanghai emerged as the top destination for out-of-province investments by listed companies from Jiangsu, Zhejiang, and Anhui, accounting for 53.32 per cent, 49.15 per cent, and 36.96 per cent of their cross-regional investments within the Yangtze River Delta, respectively.[3]

The frequent population mobility and substantial cross-regional business operations in this region necessitate the accelerated integration of public service systems. To address this need, the Yangtze River Delta region has been a pioneer in forming the network of inter-local public service delivery both within and across provinces in Yangtze River Delta region. As early as 2019, the region began executing the "Pilot Work Plan for the 'One Network Service' in the Yangtze River Delta region" to promote inter-local public service delivery for 23 personal items. The policy of "The Guiding Opinions on Accelerating Inter-provincial Public Service Delivery" issued by the State Council in 2020 listed the Yangtze River Delta as one of the four pioneering regions, which once again promoted the development of inter-local service delivery in this region.[4] Most cities set up one-to-one collaboration with another city, while others prefer alliances in surrounding areas for inter-local public service delivery, such as intercity service alliances in Nanjing Metropolitan Area, Interprovincial Service Window in the ecological and green integration development demonstration zone of Yangtze River Delta, and others. Moreover, various forms of inter-local public service delivery have emerged in these years, that is, off-site manual collection, online processing, virtual windows, etc. To now, there are 148 items of inter-local public service delivery in this region, including newborn household registration, first-time ID card applications, and marriage registration, with a total of more than 6.42 million online services.

I collected data mainly through interviews and document collection. I adopted data "triangulation" (Creswell and Miller 2000) to obtain solid results and improve internal validity, depicting the use of multiple data sources in the same study for validation purposes (Yin 2003). Semi-structured, in-depth interviews were used as an essential method of data collection, since they allow one to "get close to" the meanings and interpretations of the social actors, to their accounts of the social interaction in which they have been involved (Blaikie 2009). I selected nine cities/counties in this region: Baoshan District, Changning District, Qingpu District, Huangpu District, and Chongming District of Shanghai, Nantong City and Rudong County of Jiangsu Province, Wujiang District, Xiangcheng District, and Changshu

Table 1. A summary of data collection

	Interviews	Documents
Baoshan District, Shanghai	General Director of administrative Service Center (n = 1) Chief of Information Department of Administrative Service Center (n = 1)	Policy documents (n = 2) Work summaries (n = 3) News reports (n = 3)
Changning District, Shanghai	Deputy Director of Business Service Center (n = 1)	Policy documents (n = 2) News reports (n = 2)
Qingpu District, Shanghai	Deputy Director of Administrative Service Center (n = 1) Officials of Administrative Service Center (n = 6)	Policy documents (n = 2) Work summaries (n = 2) News reports (n = 5)
Huangpu District, Shanghai	General Director of Administrative Service Center (n = 1) Deputy Director of Administrative Service Center (n = 1) Officials of Administrative Service Center (n = 5)	Policy documents (n = 1) Work summaries (n = 1) News reports (n = 3)
Chongming District, Shanghai	Deputy Director of Administrative Service Center (n = 2) Officials of Administrative Service Center (n = 7)	Policy documents (n = 3) Work summaries (n = 3) News reports (n = 4)
Nantong City, Jiangsu	General Director of Administrative Service Center (n = 1) Deputy Director of Administrative Service Center (n = 2) Officials of Administrative Service Center (n = 2)	Policy documents (n = 3) Work summaries (n = 2) News reports (n = 2)
Rudong County, Jiangsu	General Director of Administrative Service Center (n = 1) Deputy Director of Administrative Service Center (n = 2) Officials of Administrative Service Center (n = 2)	Policy documents (n = 2) Work summaries (n = 2) News reports (n = 3)
Wujiang District, Suzhou City, Jiangsu	Deputy Director of Administrative Service Center (n = 1) Officials of Administrative Service Center (n = 4)	Policy documents (n = 3) Work summaries (n= 1) News reports (n = 5)
Xiangcheng District, Suzhou City, Jiangsu	Deputy Director of Administrative Service Center (n = 1) Officials of Administrative Service Center (n= 2)	Policy documents (n = 2) Work summaries (n = 2) News reports (n = 3)
Changshu County, Suzhou City, Jiangsu	General Director of Administrative Service Center (n = 1) Deputy Director of Administrative Service Center (n = 2) Officials of Administrative Service Center (n = 2)	Policy documents (n = 5) Work summaries (n = 3) News reports (n = 3)
Total	49	77

County of Suzhou City of Jiangsu Province. In total, 25 semi-structured interviews were carried out from July 2023 to January 2024. The duration of each interview was 90–120 minutes. The semi-structured interview protocol covered a range of topics including the initiation, development, and outcomes of inter-local public service delivery. Documentary evidence includes work summaries, policy documents, news reports, and other reference documents. Table 1 summarizes the data sources.

The Comparative Case Analysis

A Two-Scale Typology of Practical Modes

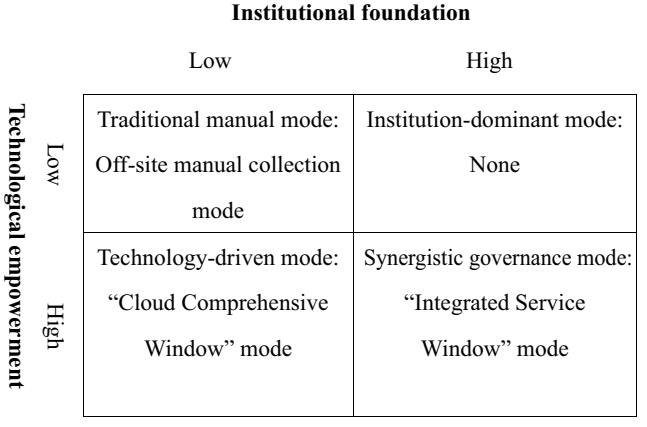
To enable a systematic comparison of the collaboration modes of inter-local public service delivery, I introduce a two-scale typology centered around the dimensions of technological empowerment and institutional foundations. Regarding technological empowerment, technical infrastructure and IT capabilities can break down the spatial and temporal barriers of existing service delivery systems. Local governments can develop online platforms for data integration and sharing to enhance the convenience and accessibility of inter-local public service delivery, while also reducing the staff's burden related to information transmission. Additionally, policies, legal support, operational standards, and procedures serve as the institutional foundation that provides governance context for inter-local public service delivery. Local governments tend to make efforts to launch supportive policies and unify procedures or standards for public service delivery across different jurisdictions.

Based on fieldwork, I have identified three collaboration modes of inter-local public service delivery[5] – that is, traditional manual mode (i.e. off-site manual collection), technology-driven mode (i.e. "Cloud Comprehensive Window"), and synergistic governance mode (i.e. "Integrated Service Window"). As shown in Figure 1, the embedded technological and institutional factors vary across these modes, leading to differences in collaborative processes, features, and also outcomes.

Traditional Manual Mode: Off-Site Manual Collection. Traditional manual mode is characterized by a low level of technological empowerment and institutional foundation, primarily established through inter-local agreements. In practice, the off-site manual collection is a typical example of a traditional manual mode. Specifically, all tasks are carried out through manual contact, remote receipt, and postal approval. Based on the inter-local agreements, staff contact their counterparts in other jurisdictions. Upon confirming feasibility, they collect the relevant materials needed for transaction processing, mail them to the corresponding departments for approval/processing, and then mail them back to the government service departments.

Essentially, this mode relies on manual processes for inter-local public service delivery rather than technological tools like integrated online platforms, which limits the efficiency of e-government collaboration. Under this mode, the completion time for the public service items includes the days for material receipt, handling, and back-and-forth mailing between the two jurisdictions, which takes at least one week. However, most jurisdictions have adopted this mode in practice because institutional barriers to inter-local collaboration are difficult to overcome under the fragmented governance structure. Due to the principle of territorial jurisdiction, the names, required materials, and handling

Figure 1. A two-scale typology of practical modes



procedures for government services differ across jurisdictions. Additionally, local governments are often reluctant to share data due to concerns about information security, and sharing authorization and approval power lacks legitimacy within the existing institutional framework. In this context, traditional manual collection and mailing of materials provide a less risky mode for inter-local public service delivery.

For example, the Administrative Service Center in Baoshan District has signed inter-local public service delivery agreements with 53 government service units across 10 provinces, focusing on matters such as public security, medical insurance, student financial assistance, inquiries into people's livelihood files, and marriage registration in different locations. In response to the high-frequency demands of enterprises, Nantong has achieved inter-local mutual recognition and sharing of 15 types and 53 items of electronic certificates in the Yangtze River Delta, including those related to real estate, provident funds, and medical insurance.

> We have a WeChat group with Tongxiang city, and we are very familiar with the staff at the government affairs office in Tongxiang. When we receive tasks from Tongxiang, we contact the officials there, who then help us connect with the relevant department offline. Since the documents need to be filed, this process also involves the mailing of materials. (Rudong County of Nantong City, Mr. Li)

This traditional manual mode has the advantages of a fast response to the demands of superiors or citizens, low construction costs, and broad applicability across a wide range of service items. As long as the two partners communicate the transaction process, they can immediately set up a service channel to quickly respond to citizens' demands and handle many off-site transactions. However, while this mode can handle short-term, intensive business affairs, it cannot achieve efficient inter-local collaboration for public

service delivery due to the lengthy process and the significant pressure it places on local staff, who must become familiar with relevant policies and standards in other jurisdictions. Additionally, this mode lacks standardized processes and mechanism design for inter-local service delivery, which hinders its sustainability and generalization in practice. "This kind of 'hand in hand' collaboration can only be a useful supplement, and its function is limited" (Xiangcheng District, Mr. Zhang).

Technology-Driven Mode: "Cloud Comprehensive Window". The technology-driven mode is characterized by a high-level technological empowerment and a low-level institutional foundation. For instance, the "Cloud Comprehensive Window" was innovated by Wujiang District of Suzhou to provide "face-to-face" remote services to the public by establishing a remote video interaction system. This mode is supplemented by visual self-service terminals to achieve technological empowerment, offering "one-on-one" guidance by staff members. However, local governments have yet to unify the standards or procedures for public service delivery with their partners, resulting in a low level of institutional foundation.

Building on the off-site manual collection mode, the "Cloud Comprehensive Window" incorporates audio-visual interaction technology. The off-site manual collection mode requires a long time to complete inter-local service delivery, which often fails to meet citizens' urgent needs. Additionally, the inconsistent standards and procedures for public service items can lead to staff misunderstandings during the actual receipt process, causing a waste of time and resources if the mailed materials are incorrect. To address these challenges, Wujiang District successfully innovated the "Cloud Comprehensive Window" mode, breaking down time and space barriers through technological empowerment. Equipped with the "Cloud Comprehensive Window" self-service terminal, camera, and color printer, staff can provide remote consultation, guidance, acceptance, and immediate service through a video connection. This mode not only improves the accuracy of connections between different locations but also significantly enhances the efficiency of public service delivery. It can handle nearly 300 high-frequency matters such as social security, medical insurance, and household registration.

> The local rules for public service delivery are not uniform. Sometimes I accept the materials, but the staff in other jurisdictions might not recognize them. So, we let them see what materials can be collected through the system. Our "Cloud Comprehensive Window" can be connected by many parties, so as long as the governments that join our platform are interconnected in a network. The "virtual window" is more like a helper. What we aim to do is simplify the process. If there is no problem with the materials remotely, the staff in another jurisdiction will give you approval in real-time, which is more timely. (Wujiang District, Miss Lu)

The application of remote screen sharing, audio-visual intelligent interaction, and other technologies to build a remote interactive platform has the advantages of high efficiency and generalizability, providing more timely public services and also reducing the burden on staff. However, this mode has not yet overcome the institutional barriers of differing standards and procedures across various jurisdictions, which limits the long-term sustainability of inter-local collaboration. This may be because the technological challenge is less

complex when compared with challenges in institutional aspects (Yang and Maxwell 2011). Additionally, the equipment required for the remote window, such as aerial photography and sensors, is expensive, leading to high costs for inter-local collaboration.

Synergistic Governance Mode: "Integrated Service Window". The synergistic governance mode features high levels of both technological empowerment and institutional foundation, and "Integrated Service Window" is a typical example of this mode. The "Integrated Service Window" is adopted by the Yangtze River Delta Integration Demonstration Zone, including Qingpu of Shanghai, Jiashan of Zhejiang, and Wujiang of Jiangsu. It can be traced back to the establishment of the "Government Online–Offline Shanghai" service window in the G60 Science and Technology Innovation Corridor in September 2018. Cities such as Songjiang in Shanghai; Suzhou in Jiangsu; Hangzhou, Huzhou, Jiaxing, and Jinhua in Zhejiang; and Hefei, Wuhu, and Xuancheng in Anhui were the first to open offline service windows to provide off-site inter-local services to enterprises within the jurisdiction of these nine cities. Building on this foundation, in June 2020, the comprehensive service window of the G60 Science and Technology Corridor in Wujiang District added a "Government Online–Offline Shanghai" special window in the Yangtze River Delta, further promoting the standardization of inter-local service delivery in this region. Moreover, Qingpu, Wujiang, and Jiashan signed an agreement on inter-local service delivery in 2021, jointly setting up the "Integrated Service Window" in the Integration Demonstration Zone. At this point, the service windows for the G60, the Yangtze River Delta, and its Integration Demonstration Zone were integrated into the Wujiang District Government Affairs Service Center, where staff provide corresponding inter-local services according to citizens' needs. In June 2023, a new "Virtual Window of Yangtze River Delta" was added to the "Integrated Service Window", providing a new technological tool to empower inter-local public service delivery.

Regarding technological empowerment, based on the platform of the "Virtual Window of Yangtze River Delta", individuals can complete the entire process of consulting and handling personal matters through video and audio connection. Additionally, Wujiang, Qingpu, and Jiashan have an integrated acceptance system to share data on the service delivery process and handling rules within this zone. This centralized information system can enhance the technical infrastructure and capabilities of local stakeholders, thereby facilitating information sharing across organizational boundaries (Chen and Lee 2017). In practice, staff simultaneously use the integrated acceptance system and the virtual window. They first access the recipient's system through the integrated acceptance system to check the relevant material requirements or rules. If there are any uncertainties, they use the virtual window for video communication with the other party to facilitate timely communication. In this way, technological application improves the efficiency and timeliness of inter-local service delivery.

In terms of institutional foundation, the three cities set up a special working group for inter-local public service delivery and established a monthly regular meeting system to unify the relevant rules, standards, and procedures. Based on the compilation of a list of high-frequency government service items, the three cities have promoted the standardization of materials, acceptance criteria, and service standards, and have achieved inter-

local authorization through the "Integrated Service Window". Unlike the "Cloud Comprehensive Window" mode, the "Integrated Service Window" aims to overcome institutional differences between regions and effectively achieve inter-local public service delivery. The institutional framework of legal and policy regulations, and unified standards could promote inter-local public service delivery by increasing its priority status, risk reduction, and trust development (Gil-Garcia and Pardo 2005; Ramon Gil-Garcia et al. 2007). Currently, more than 3,500 public service matters have been authorized for inter-local processing within this zone, greatly facilitating the public's handling of affairs.

During the process of inter-local public service delivery, the Executive Committee of the Yangtze River Delta Integration Demonstration Zone has played a significant coordinating role, providing substantial support and resources. To better advance the national strategy of Yangtze River Delta integrated development, the Executive Committee was established in November 2019 and was authorized by the Standing Committees of the People's Congress of Shanghai, Jiangsu, and Zhejiang, with the authority to coordinate and manage inter-local projects in the Demonstration Zone. Regarding inter-local service delivery, the Executive Committee funded the integrated acceptance system and provided essential guidance for institutional standardization, thus offering resources and legitimacy for technological empowerment and institutional foundation.

> The Executive Committee takes the lead in the acceptance system. You can choose Wujiang or Jiashan after logging in, and then we can go straight into their system and handle relevant affairs. (Qingpu District, Miss Chen)
>
> In 2020, under the guidance of the Executive Committee, the government departments of our three locations jointly issued the service specifications and realized the service integration of our demonstration area from the standard level. Since last year, according to the coding rules of the State Council and its implementation norms, we have been sorting out a list of administrative licensing items in the demonstration area. At present, there should be more than 150 items initially included. (Qingpu District, Mr. Xu)

Compared with the traditional manual mode and technology-driven mode, the synergistic governance mode has obvious advantages in both collaborative efficiency and effectiveness. First, due to the supportive institutional foundation of regulations and standards, the transaction costs and uncertainties associated with inter-local service delivery tend to be low, and the three cities would build substantial trust. Therefore, it is easier for them to expand their scope. As of now, more than 3,500 public service matters have been authorized within this zone, which is far greater than in other modes. Second, the application of a virtual window is crucial to overcome the spatial barriers, and the integrated acceptance system is particularly important for facilitating inter-organizational information sharing compared with the technology-driven mode. Thus, some simple affairs could be handled immediately by participating organizations through the technical infrastructure and systems, promoting collaborative efficiency, convenience, and timeliness. However, although local governments have made significant efforts to unify the rules and procedures for handling affairs within this zone, some

obstacles remain at the institutional level. For instance, due to different administrative levels and inconsistent authority in the three locations, the number and content of affairs differ across the region, creating barriers to unifying the list and standards of inter-local service delivery.

The Progression Path of Practical Modes

As shown in Table 2, local governments in the Yangtze River Delta are actively participating in inter-local public service delivery and have developed various modes in practice. During this process, digital technologies such as audio-visual interaction and data-sharing systems have been utilized to empower inter-local service delivery, as demonstrated by the practices of the technology-driven mode ("Cloud Comprehensive Window") and synergistic governance mode ("Integrated Service Window"). The digital integrated system for sharing information and data, along with the audio-visual interaction system for providing "face-to-face" guidance, helps overcome geographical distance and reduces the workload of local staff in a more efficient and effective way. Additionally, the "Integrated Service Window" mode has established a working group to unify the standards and procedures of public affairs.

Each mode has its advantages and disadvantages. By comparison, the traditional manual mode represents the most basic form, characterized by a lack of both technological tools and institutional support, relying instead on traditional manpower and procedures. The technology-driven mode is marked by strong technological empowerment but lacks institutional safeguards, often leading to challenges such as technological silos. In contrast, the synergistic governance mode reflects a deep integration of technology and institutional factors, representing an ideal type, or the desirable direction of development. In fact, there is a progression or upgrade path among these modes, starting from the traditional manual mode, advancing to the technology-driven mode, and culminating in the synergistic governance mode.

First, in the initial progression path, the practical mode primarily adopts technological facilities to improve the procedures of inter-local service delivery. For instance, in response to citizens' demands, Wujiang has innovated the "Cloud Comprehensive Window" mode by employing audio-visual interaction technology. Additionally, the Integration Demonstration Zone has established an integrated acceptance system to foster inter-local data sharing. Existing literature has indicated that the appropriate use of relevant technology can significantly improve performance in data integration (Chen and Lee 2017). Consistent with this finding, both the "Cloud Comprehensive Window" and the "Integrated Service Window" can overcome spatial and temporal barriers through technological application, thereby helping to meet citizens' urgent demands and reducing burdens on the staff. It is worth noting that the innovation of the "Cloud Comprehensive Window" has not altered the existing institutional framework, meaning that the handling rules and procedures among partners remain inconsistent. However, technology can empower inter-local public service delivery by partially overcoming the institutional challenges of inconsistent standards and policy gaps. This finding underscores the need to elevate the importance of technology in driving better performance in service integration. Compared with institutional challenges, scholars stated that technological challenge is less complicated (Yang and Maxwell 2011). In that sense, local stakeholders might be

Table 2. A comparison between different modes

Developmental stages		**Stage I**	**Stage II**	**Stage III**
Practical modes		Off-site manual collection mode	"Cloud Comprehensive Window" mode	"Integrated Service Window" mode
Technological empowerment		Low	High (audio-visual interaction)	High (audio-visual interaction and an integrated system)
Institutional foundation		Low	Low	High (a working group on unifying the standards and procedures)
Efficiency and effectiveness	Advantages	Fast response to demand, low construction cost, and a wide range of service items	High efficiency and generalizability, low staff pressure	A wide scope of service items, high efficiency, stable operation, and timeliness
	Disadvantages	Low efficiency and high pressure on staff	High cost and limited long-term sustainability	High cost

more willing to enhance the level of technological empowerment for inter-local service delivery at first. Nevertheless, challenges related to technological compatibility, interoperability, information sharing, and information system quality still persist in practice. The fundamental reasons for these technological dilemmas lie in the lack of supportive policies and unified standards and procedures.

Second, building on technological empowerment, efforts to coordinate policy standards and procedures of service delivery across jurisdictions are key to advancing the practical mode to the next stage. Existing studies have found that policy barriers are the greatest obstacles to the substantial success of information sharing and integration (Dawes et al. 2009). Additionally, difficult institutional conditions for inter-local public service delivery, such as fragmentation issues, the desire for autonomy, and the retention of interest, are common (Boudreau and Bernier 2017). In this context, the most important factor in upgrading inter-local service delivery is designing supportive policies and unifying standards and procedures for handling affairs. Compared to other modes, the "Integrated Service Window" in the Yangtze River Delta Integration Demonstration Zone has achieved a coupling of technological empowerment and institutional foundations. Besides the application of audio-visual interaction and an integrated system, the "Integrated Service Window" has made efforts to overcome institutional barriers and promote the standardization of affairs. With support from the Executive Committee, local governments in Wujiang, Qingpu, and Jiashan have granted service acceptance authority to each other, unified the list of administrative licensing items, and standardized relevant procedures. These efforts towards standardization and policy support for inter-local public service delivery not only help to overcome institutional barriers but also enhance the legitimacy of technological application and information sharing. Thus, institutional factors tend to be more fundamental and have critical effects on the performance of technological empowerment. Although local governments have begun to unify relevant rules and standards, there is still a long way to go. In particular, local governments strongly demand more policy support and further unification of standards at the central level.

Discussion and Conclusions

This study proposes a two-dimensional typology of inter-local public service delivery based on technological and institutional factors, and explores different modes of collaboration along with their potential pathways for advancement across various stages. Through an exploratory case study of inter-local public service delivery within the development of digital government in the Yangtze River Delta region of China, this paper summarizes three practical modes: traditional manual mode (i.e. off-site manual collection), technology-driven mode (i.e. "Cloud Comprehensive Window"), and synergistic governance mode (i.e. "Integrated Service Window"). The embedded technological and institutional factors vary across these modes, resulting in different levels of efficiency and effectiveness. From a comparative perspective, the synergistic governance mode of "Integrated Service Window" demonstrates clear advantages in scope, collaborative efficiency, convenience, and timeliness. It appears to be the most effective and efficient mode of inter-local public service delivery, with a high level of technological empowerment and institutional foundation. Additionally, there is a progression or upgrade path among these modes, moving from traditional manual mode to technology-driven mode, and finally to synergistic governance mode.

The findings of this study offer three key insights for advancing theory and practice. First and foremost, this comparative study presents the characteristics of the most effective mode and reveals the critical role of technology and institutional factors during the process. Based on this, practitioners can design and promote the development of inter-local public service delivery modes in a targeted manner. Second, there is a strong need for centralized guidance and policy support to unify standards and procedures during the collaboration process. It is important to note that institutional factors play a more fundamental role in inter-local public service delivery, which can also influence the performance of technological empowerment. Third, managers and researchers should pay closer attention to the role of technological factors in e-government settings, exploring more innovative solutions to enhance public service integration. The standardization and transformation of administrative rules typically take a long time. During this process, local governments can creatively and appropriately employ digital technology to partially overcome existing institutional barriers, thereby improving the performance of inter-local collaboration. It is worth noting that while the effectiveness and efficiency of these modes vary, each represents a context-specific adaptation to particular developmental stages, with no inherently superior or inferior configuration.

There are some limitations of this study that should be noted. The study only covers cases in the Yangtze River Delta region of China, which limits the validity and generalizability of our results. While the case analysis method is useful for understanding the process of inter-local public service delivery, comparative case studies in different regions of China are needed to distinguish the impact of regional contexts. Nonetheless, this study makes theoretical contributions to the literature on collaborative e-government by developing a two-scale typology through the lenses of technological empowerment and institutional foundations, comparing distinct collaboration modes and exploring potential upgrade pathways between these modes across different stages.

Notes

1. Source: https://export.shobserver.com/baijiahao/html/278306.html.
2. Source: https://m.thepaper.cn/kuaibao_detail.jsp?contid=26207894.
3. Source: https://m.thepaper.cn/kuaibao_detail.jsp?contid=26207894.
4. It is worth noting that the travel restrictions during the COVID-19 epidemic also strengthened the demand for cross-domain and one-line government services, and these innovative practices built a more convenient public service system and continued to play a role in the post-epidemic era.
5. It is worth noting that the low technological empowerment and high institutional foundation scenario could be termed as an "institution-dominant mode". However, this pattern was not observed in the Yangtze River Delta practices, and thus will not be elaborated in this study.

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