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Agility in the machine: how the agile bureaucracy reduces administrative burdens in the digital era

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Abstract

In the digital era, mitigating the widespread and inevitable administrative burdens stemming from digital bureaucratic encounters has become an urgent imperative to ensure equitable access and social inclusion. While existing scholarship on mitigating these burdens focuses on policy design and technology empowerment, research from an organizational perspective, particularly through the lens of agile bureaucracy, remains scarce. To fill this gap, this study conducts a case study of China's adoption of e-invoicing to investigate how agile bureaucracy reduces administrative burdens in the digital era. The findings reveal that agile bureaucracy effectively alleviates administrative burdens through the use of agile approaches. Concurrently, traditional bureaucracy facilitates the efficacy of these agile approaches by providing a hierarchical and rule-based framework. We argue that a synergy between agile governance and bureaucracy is essential for effective burden reduction. These insights extend our understanding of administrative burden reduction in the digital era.

1. Introduction

The widespread adoption of digital public services enhances convenience for citizens (Norris & Reddick, 2013) but can also produce unintended negative consequences, such as difficulties in navigating mandatory digital system (Madsen et al., 2022; Giest & Samuels, 2023), digital exclusion (Jilke et al., 2018; Christensen et al., 2020; Linos et al., 2022), and algorithmic "black boxes" (Peeters & Widlak, 2018; Peeters, 2023). These experiences, stemming from digital bureaucratic encounters, impose administrative burdens on citizens that deepen social inequality (Hannah-Moffat & Maurutto, 2010; Linos et al., 2022) and erode public values such as access and transparency (Moynihan et al., 2025). As digital transformation becomes increasingly pervasive across governments (Pittaway & Montazemi, 2020), the emergence of these digital administrative burdens has become a widespread and inevitable phenomenon (Peeters, 2023). Consequently, mitigating these burdens has emerged as an important concern for scholars and practitioners in public policy and administration.

Existing scholarship on reducing administrative burdens in the digital era primarily focuses on policy design (Peeters & Widlak, 2018; Giest & Samuels, 2023; Moynihan et al., 2025) and technology empowerment (Scholta, 2019; Madsen et al., 2022). However, there remains a notable absence of studies addressing these burdens from an organizational perspective, particularly regarding the role of agile bureaucracy. Conceptually, agile bureaucracy is defined as a traditional bureaucratic organization that integrates agile governance ideology[1], one that emphasizes citizen-centricity, flexibility, collaboration, and responsiveness (Mergel, 2016; Soe & Drechsler, 2018; Tai & Awasthi, 2025; Johannessen, 2025).

Agile bureaucracy emerges as an ideal organizational model for mitigating administrative burdens, particularly in the digital era. On one hand, administrative burdens often stem from a lack of bureaucratic responsiveness and empathy toward citizens. Agile governance, characterized by its responsiveness and citizen-centricity, is well-positioned to address administrative burdens. Moreover, agile governance,

which is originated in software development (Mergel, 2016), offers a robust framework for managing the digital technologies that are often the primary cause of administrative burdens in the digital era (Peeters, 2023). On the other hand, administrative burdens are often a consequence of decisions in resource allocation and the design of policies, programs, and administrative procedures (Herd & Moynihan, 2019). Therefore, bureaucratic organizations can play an important role in shaping administrative burdens due to their rule-based and impersonal nature.

Although agile bureaucracy is theoretically well-fitted to overcome administrative burdens in the digital era, little is known about the underlying mechanism through which it functions in burden reduction. To fill this gap, and given that agile bureaucracy comprises two core conceptual components, agile approaches and traditional bureaucracy, this overarching mechanism can be unpacked into two interrelated research questions: *first, through what specific pathways do agile approaches achieve effective burden reduction? Second, what role does the bureaucracy play throughout this process?* We investigate these two questions through a case study of China's adoption of e-invoicing.

Despite the promising potential of e-invoicing to bring convenience to citizens by upgrading paper invoices to digital formats (Bellon et al., 2022), its implementation has also triggered unintended consequences that intensify administrative burdens. These include cumbersome operational requirements, system instability, and rigid invoicing regulations. Therefore, the adoption of e-invoicing in China serves as a representative case of how digital architecture can paradoxically generate new forms of administrative burdens.

By interviewing tax officials, technical developers and taxpayers in central China, we identify that agile bureaucracy reduces administrative burdens through three mechanisms, namely effective and efficient responsiveness, user-centric technological redesign, and empowered and data-driven flexibility in frontline services. Meanwhile, the traditional bureaucratic structure facilitates these agile methodologies by offering a stable, rule-governed environment. We argue that a synergistic interplay between agile approaches and bureaucracy is essential for effective burden reduction: while bureaucracy provides a stable operational framework, agile approaches enable the system to overcome institutional rigidity. Furthermore, we highlight the importance of grassroots burden reduction mechanisms, data integration mechanisms, and the government's deep participation in sustaining the efficacy of agile bureaucracy. Our objective extends beyond merely offering policymakers a "menu" of burdens administrative reduction strategies. Rather, we seek to further develop a research agenda on the mechanisms to alleviate administrative burdens from an organizational perspective.

This study makes several contributions to the literature. First, it contributes to the literature on the factors shaping administrative burdens. By demonstrating how agile methodologies mitigate administrative burdens and highlighting the enabling role of bureaucracy, this study underscores the pivotal role of organizational form in shaping these burdens. This perspective complements prior research that focuses on policy design (Moynihan et al., 2016; Bell & Meyer, 2024), frontline implementation (Bell & Smith, 2022; Halling, 2025), information communication (Linos et al., 2024;

Nagtegaal et al., 2026), and participation of social actors (Herd & Moynihan, 2019; Johnson, 2026). Second, moving beyond traditional public service contexts, this study deepens our understanding of how administrative burdens are generated and mitigated within the context of regulatory and digital governance. Extant research on interventions for administrative burdens in the digital era focuses heavily on policy design (Peeters & Widlak, 2018; Giest & Samuels, 2023; Moynihan et al., 2025) and technology optimization (Scholta, 2019; Madsen et al., 2022). The organizational perspective, however, remains largely unexplored in the literature and our study fills this gap.

Third, the article contributes to the understanding of agile bureaucracy by demonstrating its efficacy within the field of digital governance. China's adoption of e-invoicing provides an ideal case to explore how agile bureaucracy functions in this context. Notably, while existing literature highlights the inherent tensions between agility and bureaucracy (Baxter et al., 2023; Neumann et al., 2024; Tai & Awasthi, 2025), our findings reveal a synergistic relationship where these two elements work in tandem to alleviate administrative burdens. Finally, from a broader perspective, our study contributes to the debate concerning the ideal organizational form for building an innovative state, especially in the digital era.

2. Literature review

2.1. Conceptualization and determinants of administrative burdens

Administrative burden, which refers to citizens' experiences of onerous interactions with government (Burden et al., 2012; Moynihan et al., 2015), has garnered growing scholarly attention in the field of public administration. Moynihan, Herd, and Harvey (2015) classify these burdens into three broad categories: learning costs (the effort to comprehend bureaucratic processes), compliance costs (meeting service access requirements), and psychological costs (e.g., stress, frustration, or stigma). Such burdens discourage citizen participation in welfare programs (Herd et al., 2013; Fox et al., 2023), undermine citizens' trust in government and public services (Bell et al., 2024), and exacerbate social inequality (Peeters, 2020).

A large body of literature indicates that policymakers and politicians may deliberately construct administrative burdens to fulfill policy goals, such as labor market integration (Fox et al., 2023), to conserve limited resources for the most needy (Herd et al., 2013), or to cut public expenditures (Moynihan et al., 2015). Concurrently, the understanding that administrative burdens are deliberately constructed rather than accidental suggests the possibility of their reduction (Benish et al., 2024). Existing research concerning the determinants shaping administrative burdens is categorized into four clusters, policy design, frontline implementation, information communication, and the participation of social actors.

First, governments reduce administrative burdens through policy design, including red tape reduction (Fox et al., 2020; Hattke et al., 2020; Linos & Riesch, 2020; Graff, 2025) and street-level bureaucrats'

workload alleviation (Bell & Meyer, 2024; Mikkelsen et al., 2024). Second, since administrative burdens are generated during bureaucratic encounters, the behavior of frontline workers significantly shapes citizens' experiences. Specifically, street-level bureaucrats' role adoption (Bell & Smith, 2022) and their exercise of discretion (Halling, 2025) directly influence how citizens experience these burdens.

Third, information communication and administrative design critically shape administrative burdens by influencing the difficulty citizens face in acquiring and understanding policies. Relevant interventions include communication simplification and reframing (Hock et al., 2021; Lasky-Fink & Linos, 2024; Linos et al., 2024), user-centered administrative process redesign (Linos et al., 2020; Nagtegaal et al., 2026), and regulatory streamlining (Zhou & Mast, 2026). Finally, non-state actors, including citizens (Johnson, 2026), for-profit firms (Herd & Moynihan, 2019), and non-profit organizations (Herd & Moynihan, 2019; Tiggelaar & George, 2025; Yang, 2026), play an increasingly important role in shaping administrative burdens. Despite these rich insights into the determinants of administrative burdens, existing research has yet to systematically identify and explore these determinants from an organizational perspective.

2.2. Administrative burdens in the digital era

In the digital era, the digitalization of administrative practices has changed the nature of citizen-state interactions, thereby reshaping the characteristics of administrative burdens (Peeters, 2023). Most studies have focused on traditional settings of bureaucratic encounters, where burdens emerge at the intersection of face-to-face encounters and restrictions of social policy. Unlike these traditional contexts, administrative burdens in the digitalized context arise because citizens require skills to navigate the mandatory digitization applications (Madsen et al., 2022; Alfalah et al., 2025) and may suffer digital exclusion driven by biased data (Obermeyer et al., 2019) and black-box algorithms (Peeters & Widlak, 2018).

Existing remedies for administrative burdens in the digital era fall into two categories. Policy designs include no-stop shops (Scholta, 2019), digital-skills support (Giest & Samuels, 2023), legal safeguards (Moynihan et al., 2025), and pilot programmes (Moynihan et al., 2025); technological interventions improve system design (Peeters & Widlak, 2018; Larsson, 2021; Peeters et al., 2023), simplify language (Madsen et al., 2022), and preserve alternative access channels for disadvantaged groups (Linos et al., 2022). Yet this literature rarely examines the organizational arrangements that coordinate these interventions, despite the importance of agile bureaucracy in public-sector digitalization (Mergel, 2021; Johannessen, 2025).

2.3. The effectiveness of agile bureaucracy

Agile bureaucracy is defined as a bureaucratic organization that integrates agile governance approaches (Johannessen, 2025). A traditional bureaucratic organization constitutes an institutional structure characterized by hierarchical authority, functional specialization, and formal rule-based procedures, deigned to achieve efficiency, predictability, and stability (Weber, 1946). In contrast, agile governance, originating in software engineering, offers a dynamic, iterative approach emphasizing flexibility,

collaboration, and responsiveness to address complex challenges and deliver public value (Mergel, 2016; Soe & Drechsler, 2018; Zuber et al., 2022; Tai & Awasthi, 2025).

The synthesis of these two seemingly divergent paradigms is driven by the increasingly complexity of public affairs and the inherent limitations of traditional bureaucracy. On one hand, public affairs are increasingly characterized by high levels of vulnerability, uncertainty, complexity, and ambidexterity (VUCA) (Bennett & Lemoine, 2014; Millar et al., 2018). On the other hand, the waterfall workflows and rigid, rule-based frameworks of traditional bureaucracy are often ill-equipped to address these challenges. Against this backdrop, many public organizations have adopted agile methodologies, noted for flexibility, adaptability, and speed, to tackle these wicked problems (Mergel et al., 2018; Mergel, 2024; Mergel, 2026). Ultimately, agile bureaucracy represents a hybrid model that integrates elements of both traditional bureaucracy and agile methods (Johannessen, 2025).

Compared with traditional bureaucratic organizations, agile bureaucracy delivers public services more effectively, efficiently, and in a human-centric manner (Mergel et al., 2021; Mergel, 2024). Studies have investigated the effectiveness of agile bureaucracy in specific fields, including software development, crisis management, and regulatory enforcement (Ylinen, 2021; Moon, 2020; Su & Sun, 2025).

While agile bureaucracy effectively addresses certain public affairs, recent literature underscores the inherent tensions between agile methods' emphasis on flexibility and iterativeness and the bureaucracy's focus on hierarchical organizing and legal processes (Mergel et al., 2021; Johannessen, 2025). These tensions often hinder the transition from plan-driven methods (Lappi & Aaltonen, 2017) and diminish managerial motivation to support agile approaches (Mergel, 2016; Mergel, 2024). To mitigate these conflicts, several strategies have proven effective, including launching small-scale experiments as viable entry points (Ylinen, 2021), strengthening a "one-team" culture and repositioning contractors as "mission collaborators" (Baxter et al., 2023).

2.4. Agile bureaucracy and administrative burdens in the digital era

Based on a review of the literature on administrative burdens in the digital era and agile bureaucracy, it can be inferred that agile bureaucracy serves as an appropriate organizational model for addressing such burdens. First, as administrative burdens are characterized by a failure to meet public demand (Moynihan et al., 2025), the agile methodologies' emphasis on citizen-centricity and immediate feedback provides a mechanism to mitigate these failures (Mergel et al., 2021). Furthermore, originating from software engineering (Mergel, 2016), agile methodologies provide a systematic framework for managing digital technologies, which are widely regarded as the primary drivers of administrative burdens in the digital era (Peeters, 2023). Moreover, because these burdens are dynamic and emerge from complex human-technology interactions (Peeters, 2023), agile approaches are well-equipped to manage such uncertainty due to their high responsiveness to dynamic environments (Snowden & Boone, 2007; Mergel, 2024). Finally, reducing such burdens is a complex (Madsen et al., 2022; Peeters, 2023), long-term

(Peeters et al., 2025) process that requires sustained political support and resource allocation. The hierarchical bureaucracy ensures the orderly implementation of such large-scale projects (Olsen, 2006).

Although agile bureaucracy is a promising organizational form to mitigate administrative burdens in the digital era, empirical research on this topic remains scarce. Accordingly, we ask how agile bureaucracy reduces administrative burdens and how its agile and bureaucratic components contribute to this process.

3. Context and Methods

3.1. Research context

China launched its e-invoicing reform in 2015 to replace paper invoices with digital ones. The reform digitized invoice issuance, use, archiving, and accounting, reducing retrieval, mailing, and storage costs (Lü & Zhang, 2026). However, it also generated administrative burdens. Specifically, the introduction of the new system requires business and citizens to master digital platforms and unfamiliar rules, thereby incurring learning costs. Furthermore, alongside the implementation of e-invoicing system, tax authorities introduced rigid monthly quota management, limiting the total monetary value a company can invoice within a calendar month. When these rigid quotas fail to meet actual need of business, taxpayers may suffer an insufficient supply of invoices, which disrupts normal operations and generates compliance costs. Finally, some officials exhibit a passive responsiveness, treating taxpayers' inquiries as trivial or unnecessary. Such negative interactions significantly heighten psychological costs.

To improve e-invoicing services and reduce administrative burdens, the Zhengzhou Municipal Tax Service launched the Five-Terminal Service Optimization (FTSO; Wu Duan You Hua) in 2023. This initiative enhances the agility, effectiveness, and user-friendliness of five key interfaces for digital state-citizen interaction, namely hotlines, desktop portals, mobile applications, physical windows, and cloud-based platforms.

The FTSO includes three main dimensions of reform: response procedures, service logics, and technological foundations. First, in terms of response procedures, the reform shifts from a traditional, multi-tiered problem-routing model toward a mechanism of rapid responsiveness that empowers frontline staff across multiple channels, including hotlines, online platforms, and physical service halls. Meanwhile, tax authorities focus on aggregating citizen reported issues. By resolving these problems across different administrative levels, they continuously optimize e-invoicing system through rapid, incremental, and iterative adaptation. Second, tax authorities place greater emphasis on user-centric service logics. Driven by formal regulatory documents and performance measurement regimes from higher authorities, frontline staff are mandated to sustain high standards of service quality and responsiveness to taxpayers. Third, in the technological dimension, by synthesizing multi-source data related to companies' operational status, the authorities construct comprehensive risk profiles for firms, using predictive algorithms to dynamically adjust monthly e-invoicing quotas.

Consequently, Zhengzhou provides a theoretically informative case. First, the adoption of e-invoicing represents a typical and significant transformation in digital public service delivery. Furthermore, while e-invoicing offers considerable convenience for business and citizens, its implementation unexpectedly introduces a source of administrative burdens. Finally, Zhengzhou, China, serves as an ideal site to explore how an agile bureaucracy alleviates administrative burdens. On one hand, China's governance structure is characterized by rigid hierarchy, functional specialization, and procedural legitimacy, exemplifying a traditional bureaucratic organization. On the other hand, Zhengzhou's FTSO reform initiative has infused agility, responsiveness, and user-friendliness into its tax administration. Recognized as an exemplary model of agile governance by the Henan Provincial Committee of the CPC, Zhengzhou's superior authority, the FTSO reform confirms that Zhengzhou's tax authorities represent a mature agile bureaucracy, embedding agile approaches within a traditional bureaucratic organization.

3.2. Data collection

From May to December 2025, we conducted a tracing investigation into the promotion of e-invoicing in China. Employing semi-structured interviews, participant observations, and secondary data analysis, we collected a rich set of data. Based on these multi-source data, we employed a triangulation strategy to improve the validity and reliability of the findings (Denzin, 2017).

We used purposive and snowball sampling strategies to recruit 29 participants across three groups, including 15 tax officials, 3 technology providers, and 11 taxpayers. Tailored interview protocols were developed for each group to address their specific contexts (see Appendix A). Initially, purposive sampling was used to identify four key informants: two tax authority leaders, one technology service manager, and one accountant who is familiar with e-invoicing affairs. Subsequently, snowball sampling was employed, leveraging these initial respondents to identify further participants involved in e-invoicing management. We held multiple rounds of semi-structured interviews, each lasting over an hour. Appendix B provides detailed information on the semi-structured interviews, participant observations, and secondary data, while Appendix C lists the key documents collected for the study.

3.3. Data analysis

In line with the study's interpretivist qualitative framework, we sought to ensure that the findings emerged from respondents' own interpretations of organizational behaviors. We used deductive thematic analysis to identify how agile bureaucracy addresses administrative burdens (Braun & Clarke, 2021).

In order to ensure this study's confirmability, the coding process was iterative and was conducted as follows: First, members of the research team initially read all interview responses to gain a comprehensive understanding of the participants' feedback. The researchers then independently coded a subset of transcripts using an initial set of manual codes. This step was crucial for testing consistency in interpretation and refining the codebook. Following discussion and reaching consensus on coding definitions, the final codebook was applied to the entire set of interviews. Each transcript was reviewed and coded by two researchers. Any discrepancies in code assignment were discussed until a consensus

was reached. The finalized codes were then grouped under the predetermined topics derived from the analytical framework. After data analysis, we identified five themes through the coding process. This led to two overarching themes: *Agile approaches* and *Enabling Mechanisms of Bureaucracy*. Figure 1 shows our data coding structure.

4. Findings

4.1. Agile approaches to reduce administrative burdens

4.1.1. Effective and efficient responsiveness

The most pervasive administrative burdens faced by business and citizens is the passive responsiveness of tax administrators, which manifests in three primary dimensions: delayed responses, ineffective problem-solving, and administrative indifference. As one accountant recalled: “we tried hotlines and tax halls for early e-invoicing glitches. Their slow, icy, and useless responses solved nothing, just causing us massive stress.” (C8)

In the first half of 2023, the Zhengzhou Municipal Tax Authority adopted agile approaches to address taxpayers’ e-invoicing challenges through the FTSO reform. Under this initiative, tax authorities established multi-source channels, including hotlines, desktop portals, mobile applications, physical windows, and cloud-based platforms, to capture public demands and enhance accessibility for diverse citizens to express their concerns. Each channel provided rapid responses to both individuals and businesses, ensuring that the assistance met public needs. Furthermore, tax authorities prioritized the quality of interaction. Online responses are approachable and exhaustive, while services at the physical halls and through hotlines were characterized by attentive listening, meticulous guidance, and a citizen-centric attitude. These reform measures align with core agile principles, specifically user-centricity and rapid responsiveness (Mergel et al., 2021). A manager and clerk in a consulting service enterprise noted:

Thanks to the FTSO, the 12366 hotline has become much faster. Most of our questions now get settled on the same day. Although policies change frequently, every time we consult, we get clear and accurate guidance. (C9 and C10)

4.1.2. User-centric technological redesign

Technological instability also significantly affects learning and compliance costs. In the early stages of e-invoicing adoption, e-invoicing service platform often suffered from system bugs and lags. Moreover, unintuitive interface designs combined with dense technical jargon created substantial learning barriers for users. In response to these technological shortcomings, tax authority collaborated actively with technical service providers during the FTSO reform.

Specifically, Provincial teams focused on resolving localized network and deployment issues in collaboration with provincial branches of technical service provider, while the State Taxation

Administration addressed systemic upgrades with the technical service provider headquarter. Tax authorities adopted a “small steps, fast sprints” approach (B3), rather than waiting for a single major overhaul. They used rapid, iterative cycles to constantly upgrade the platform based on real-world feedback. These characteristics of technical improvement align with the agile principles (Mergel et al., 2021; Choi & Cucciniello, 2026), specifically emphasizing citizen-centric, shortened software delivery timescales and multi-stakeholder collaboration.

Through continuous debugging and optimization, system stability has significantly improved, eliminating the previous errors and bugs. The workflow design is now clear and user-friendly. As one accountant noting, “I can complete the entire invoicing process in just a few clicks. I can even issue an invoice while waiting for the bus”. (C5) Furthermore, the platform’s language has been “de-bureaucratization”, becoming plainer and more accessible to taxpayers. An accountant from Company H shared their experience using the enhanced e-invoicing platform:

To be honest, the system used to be such a nightmare with all the constant errors and clunky steps, but the recent updates from the tax department have really turned things around. It’s finally becoming intuitive and straightforward. Everything is so much cleaner now, which makes our daily filing feel like a breeze instead of a chore. (C7)

4.1.3. Empowered and data-driven flexibility in frontline services

The implementation of rigid monthly digital quota management following the adoption of e-invoicing has emerged as another critical factor influencing the compliance costs of business, as discussed in Section 3.1. A tension persists between the fluctuations of commercial activity and the rigid quota constraints.

A representative case occurred in the construction material industry whose monthly order volumes fluctuate significantly. This industry is closely tied to downstream real estate development, where the workforce primarily consists of rural-to-urban migrant workers. These workers typically return to their rural hometowns for farming during the peak agricultural seasons in June and September. This seasonal migration necessitates a significant intensification of construction activities in the months during these periods, consequently leading to a surge in order volumes for construction materials. However, as the manager of Company X, a typical building materials company, noted:

When e-invoicing and quota controls first rolled out, we really struggled to get enough quota in time for peak seasons. We had to prepare mountains of paperwork just to justify an adjustment. Whenever we asked for an increase, the tax officials were just so slow to respond. It would take a week or two, and often, they wouldn’t reply at all. This created bottlenecks in the supply chain and caused serious delays back at the construction site. (C5)

In response to the public demand for efficient e-invoicing quota adjustments, three measures were implemented during the FTSO reform, facilitating the rapid approval of quota adjustment. First, to enable

frontline staff to respond promptly to business application, higher-level tax authorities have empowered them with greater discretion over quota adjustment. Furthermore, tax authorities have constructed a comprehensive dataset to ensure accurate business credit assessments. This dataset integrates interdepartmental information, including industrial, commercial, fiscal, judicial, and regulatory data, with internal corporate records such as financial, operational, marketing, and human resources data. Through this multi-source data integration, companies applying for quota adjustments are no longer required to provide extensive certification materials. Using the multi-source data, tax authorities calculate comprehensive indicators, such as credit ratings and historical compliance, to measure company risk levels. Finally, an intelligent risk control algorithm based on profiling has been adopted to dynamically profile companies according to these risk indicators.

Based on a company's risk profiling and the magnitude of the required invoice quota adjustment, frontline staff typically use two distinct methods: automated real-time process or manual review-based adjustment. The former mainly targets high-credit taxpayers requesting minor adjustments. The tax service system assesses taxpayers' credit by applying that merges interdepartmental information with internal corporate records. Since most applicants qualify as high-credit, the system typically approves and updates their monthly quotas automatically and within a very short time. In contrast, manual review-based quota adjustment is required for substantial increase requests, sensitive industries, or newer companies. This process involves a joint analysis by municipal and district tax officers to decide on the adjustment. Although more time-consuming than the automated path, this manual process remains efficient, typically reaching a decision within five to seven working days.

By using data-driven flexibility in frontline services, the FTSO effectively aligns e-invoicing quota adjustments with taxpayer needs, thereby reducing compliance for businesses. The Accountant of Company X remarked:

Since the five-terminal optimization late 2023, adjusting our monthly invoice quota has been lightning fast. It's approved the same day now, with just basic info, no more piles of paperwork! This change has been a lifesaver because it means we can get materials delivered to the construction sites right on time without any delays. (C5)

Having depicted how agile bureaucracy reduces administrative burdens through three agile approaches, this section details the specific forms of these burdens and their corresponding countermeasures, as summarized in Table 1.

Table 1
Administrative burdens and their corresponding reduction strategies.

Types of administrative burdens		Strategies to reduce
Learning costs	Difficulty to handle the system	Effective and efficient responsiveness, user-centric technological redesign
Compliance costs	Rigid quota management	Effective and efficient responsiveness, empowered and data-driven flexibility in frontline services
Psychological costs	Passive responsiveness	Effective and efficient responsiveness

4.2. The enabling mechanisms of bureaucracy in alleviating administrative burdens

Although bureaucracy is frequently criticized for its rigidity, inefficiency, alienation and dehumanization (Olsen, 2006; Monteiro & Adler, 2022), our findings suggest that traditional bureaucratic organization remains indispensable for facilitating agile approaches to mitigate administrative burdens. We identify two enabling mechanisms rooted in bureaucratic structures: hierarchical problem filtering and rule-based administrative constraint.

4.2.1. Hierarchical problem filtering

While hierarchy is often criticized as an inefficient organizational structure (Leibenstein, 1987), we find that this attribute of traditional bureaucracy actually facilitates highly effective and efficient responses to high volumes of taxpayers' inquiries. Specifically, during the FTSO, tax authorities implemented a Four-Tier Hierarchy Agile Response Model (Fig. 2), using top-down coordination across four tiers of tax authorities[2]to streamline service delivery.

In the first round of response, District Tax Services collect taxpayer inquiries regarding e-invoicing through multiple channels, including hotlines, online platforms, and physical service halls. Frontline staff provide direct guidance for operational questions; however, questions regarding systemic issues that cannot be immediately resolved are escalated to the Municipal Tax Services for further action. In the second round, the Municipal Tax Services function primarily as a transit hub, receiving complex, unresolved questions escalated from the district level. They resolve a small portion of these issues directly, but their main role is to assess systemic problems and quickly report them to the Provincial Tax Services for resolution. In the third round, the Provincial Tax Services engage in collaborative governance with local technical service providers to address system questions escalated from the municipal level. These service providers resolve localized environmental or network issues directly, while system flaws or bugs that cannot be solved at the provincial level are compiled and reported to the State Taxation Administration. In the fourth and final round, the State Taxation Administration acts as a top-level strategic system-steward, collaborating with the technical service provider's headquarters to resolve all

remaining systemic and technical issues. Once resolved, the State Taxation Administration promptly disseminates the information to the subordinate tax authorities and affected taxpayers.

Questions faced by taxpayers are classified into three categories: operational inquiries, invoicing quota adjustments, and systemic problems. These issues are assigned to diverse entities across different administrative levels based on their typology. Functioning like a funnel, the District Tax Services handle the bulk of routine operational questions and quota adjustments. Escalated cases, such as minor operational issues, are addressed by the Municipal Tax Services, while Provincial Tax Services manage localized systemic problems in coordination with provincial technical service providers. Finally, the State Taxation Administration tackles global systemic issues with the technical provider's headquarters. This hierarchical problem-filtering mechanism categorizes the vast volume of inquiries and allocates them to the appropriate levels of tax authorities. By ensuring that "each level does what it's best at" (A2), the system resolves these administrative burdens both efficiently and effectively.

4.2.2. Rule-based administrative constraint

Rigid administrative rules represent another salient feature of bureaucracy, emphasizing that individuals within the organization must comply with the regulations established by the authority. To further ensure the responsiveness and effectiveness of tax authorities, the FTSO introduced a rigid performance measurement system comprising two key indicators, practical problem-solving effectiveness and citizen satisfaction. The former constitutes an objective measure of resolution outcomes, whereas the latter is a subjective indicator assessed via post-consultation follow-ups concerning staff attitude and integrity. These metrics are critical criteria for promotions and awards. Therefore, frontline staff pay close attention to the quality and timeliness of their responses to avoid negative performance evaluations. A frontline staff member in District Tax Services stated:

In our daily work, we generally stick to the requirements for quick responses and effective solution. Sure, there are times when we might get a bit distracted or feel like slacking off, but these two performance indicators really keep us on our toes. Generally speaking, as long as you take the job seriously, passing these evaluations usually isn't an issue. (A15)

4.3. Synergizing agile governance and bureaucracy to reduce administrative burdens

The preceding sections have illustrated how agile bureaucracy reduces administrative burdens, supported by the enabling role of traditional bureaucracy. While extensive scholarship has highlighted the inherent tensions between traditional bureaucratic structures and agility (Mergel, 2024; Johannessen, 2025), often emphasizing the negative outcomes of their integration (Mergel, 2016; Mergel, 2024), this study offers a different perspective. We find that agile governance and bureaucracy can coexist harmoniously to alleviate administrative burdens. Through mutual empowerment, these two elements generate a synergistic effect, where their collective impact significantly exceeds the sum of their individual contributions in isolation.

On one hand, bureaucracy provides a stable operational framework for agile practices. Specifically, hierarchical organizational structure decomposes vast volumes of business and citizens' inquiries and assigns these large-scale tasks to different levels of tax authorities, achieving a precise division of labor for agile approaches at each tier. Simultaneously, rule-based administrative constraints ensure that performance indicators maintain their binding authority, pushing frontline staff to interact with taxpayers with greater responsiveness and agility. One the other hand, agility helps bureaucracy to overcome its inherent institutional rigidity. Agile approaches infuse the bureaucracy with rapid, flexible, and user-centric attributes. By establishing a "problem perception-processing-feedback" closed-loop, agility addresses administrative burdens at a rapid pace, overcoming bureaucratic rigidity and inertia. Furthermore, multi-agent collaboration breaks down the silos between various entities both within and beyond the bureaucratic organization, ensuing the seamless and efficient redesign of digital systems.

In summary, we conclude that bureaucracy provides the necessary order and regulatory framework to stabilize agile flexibility, while the fluidity of agility enhances the bureaucracy's effectiveness in handling complex administrative burdens (Fig. 3). Adoption of agile methods is not aimed at dismantling the bureaucracy, but rather at integrating agile governance into the rigid "machine" to enhance its overall responsiveness.

4.4. Safeguard mechanisms for the agile bureaucracy

While agile bureaucracy appears to be a fitting and effective strategy to reduce administrative burdens, its sustainability and generalizability warrant further investigation. Accordingly, we discuss the safeguard mechanisms, focusing on grassroots burden reduction mechanisms, data integration mechanisms and government's deep participation.

Grassroots burden reduction mechanisms are the primary concern. Following the FTSO, frontline staff adopted an agile working style that increased their workload. To mitigate these pressures, several measures were implemented, such as allocation of sufficient personnel quotas and the establishment of staff rotation schemes. These mechanisms are essential for ensuring the sustainability of agile governance in this case.

Moreover, establishing data integration mechanisms is a fundamental prerequisite for enabling data-driven flexibility. Achieving effective data sharing remains challenging due to several factors, including vulnerability to cyberthreats (Caldarulo et al., 2024), limited lateral coordination (Willem & Buelens, 2007), and non-uniform data standards (Otjacques et al., 2007; Gil-Garcia & Sayogo, 2016). To ensure the feasibility of sharing, the central government has constructed a comprehensive legal framework[3], established dedicated task forces to provide institutional support, and deployed secure technical solutions such as blockchain and privacy-enhancing technologies. These mechanisms are critical for the success of multi-source data integration.

Finally, sustained government participation enables agile bureaucracy. As recent scholarship suggests (Pittaway & Montazemi, 2020; Breaugh et al., 2023), the role of government moves beyond merely

serving as an institutional designer and legitimacy provider. It should also act as an enabler and facilitator. Consequently, governments should be deeply involved in the digital transformation process. In this case, tax authorities translated taxpayers' needs into technical requirements and collaborated with technology providers to resolve them, acting not only as institutional designers but also as facilitators of digital transformation.

5. Discussion and Conclusion

Drawing on a case study of China's e-invoicing adoption, this study examines how an agile bureaucracy mitigates administrative burdens in the digital era. Although digital architecture offers convenience to citizens, it may also trigger unintended administrative burdens. Our findings suggest that agile approaches, including effective and efficient responsiveness, user-centric technological redesign, and empowered and data-driven flexibility in frontline services, are effective for burden reduction. Concurrently, the traditional bureaucracy facilitates these agile methodologies through two mechanisms: hierarchical problem filtering and rule-based administrative constraint. Rather than viewing agility and bureaucracy as being in inherent tension as many existing studies (Baxter et al., 2023; Neumann et al., 2024; Johannessen, 2025; Tai & Awasthi, 2025), we demonstrate that they can work in tandem and reinforce each other to ensure effective burden reduction. Furthermore, we propose a set of safeguarding mechanisms, namely, grassroots burden reduction mechanisms, data integration mechanisms, and government's deep participation, to sustain the long-term efficacy of agile bureaucracy. Figure 4 presents a theoretical framework delineating the mechanisms of agile bureaucracy in mitigating administrative burdens in the digital-era.

5.1. Theoretical contributions

This study contributes to the literature on administrative burdens and agile bureaucracy in several ways. First, we enrich the current understanding of the factors shaping administrative burdens. Halling and Baekgaard (2024) conceptualized these factors through a framework encompassing formal policy design (Peeters et al., 2023) and informal policy design, the latter including street-level bureaucrats' behavior (Bell & Smith, 2022; Halling, 2025) and information communication (Linos et al., 2024; Nagtegaal et al., 2026; Zhou & Mast, 2026). Our study extends this framework by introducing an organizational lens. Specifically, we highlight the distinct role of the organizational model, positioning agile bureaucracy as an ideal organizational form for administrative burden reduction.

Our findings show that agile bureaucracy reduces administrative burdens through three agile approaches, namely effective and efficient responsiveness, user-centric technological redesign, and empowered and data-driven flexibility in frontline services. These mechanisms align with extant research that underscores the value of effective communication (Benish et al., 2024), user-centered approach (Nagtegaal et al., 2026), and algorithm-driven, data-integrated responsiveness (Scholta et al., 2019). Crucially, agile bureaucracy synthesizes these discrete approaches into a cohesive organizational arrangement.

Second, our study also sheds light on the generation and reduction of administrative burdens within the context of regulatory (Guidi & Levi-Faur, 2020) and digital governance (Dunleavy et al., 2006). We find that compliance costs stem from the introduction of a rigid, monthly e-invoicing quota system. This regulatory design is explicitly intended to curb illegal invoicing practices and prevent tax erosion. Therefore, the administrative burdens in regulatory governance are intentionally constructed by policymakers, aligning with the assertion by Herd et al. (2013). However, the underlying mechanism in this regulatory context differs from that in the traditional welfare application context. In the former, administrative burdens arise from risk-interception mechanisms that inadvertently spill over to compliant groups, whereas in the latter, administrative burdens emerge from a complicated application process designed to ration welfare resources to eligible citizens.

This study also advances the understanding of the interventions for administrative burdens within the digital governance context. Moving beyond traditional solutions focusing on policy design (Peeters & Widlak, 2018; Giest & Samuels, 2023; Moynihan et al., 2025) and technology optimization (Scholta, 2019; Madsen et al., 2022), we introduce a novel organizational dimension, agile bureaucracy. This study illustrates how agile bureaucracy employs agile approaches to mitigate these burdens. Furthermore, we emphasize the enabling role of traditional bureaucratic structures alongside three critical safeguarding mechanisms. By integrating these elements, our proposed theoretical framework broadens the existing repertoire of strategies for addressing administrative burdens in the digital era. While being contextually grounded, the mechanisms and relationships articulated in the theoretical framework may serve to explain and guide action in other situations (Feldman & Orlikowski, 2011).

Third, our study contributes to the literature on agile bureaucracy. Responding to the call for more empirical evidence regarding the effectiveness of agility in the public sector (Mergel et al., 2021; Tai & Awasthi, 2025), we demonstrate the pivotal role of agile bureaucracy in administrative burden reduction. Furthermore, our study extends the application of agile bureaucracy beyond its traditional domains, such as software development (Mantovani Fontana & Marczak, 2020; Ylinen, 2021), crisis management (Moon, 2020; Kim, 2021), and regulatory enforcement (Su & Sun, 2025), into the realm of routine digital governance.

Extensive scholarship has identified the negative outcomes of adopting agile methods in bureaucratic organizations. For instance, the agencies may suffer from the institutional decoupling and a “split personality”, where teams face increased burdens and are forced to lower their performance expectations (Johannessen, 2025), ultimately leading to the lack of trust and conflict among stakeholders (Berger, 2007). Contrary to the conventional view emphasizing the inherent tension between agile methodologies and bureaucratic structures (Berger, 2007; Ylinen, 2021; Baxter et al., 2023; Neumann et al., 2024; Johannessen, 2025; Tai & Awasthi, 2025), this study underscores their complementary relationship. We demonstrate that while agile approaches overcome the institutional rigidity of bureaucracy, bureaucracy provides a necessary stable operational framework. In particular, we underscore that hierarchical structures can facilitate the agile approaches. This aligns with research on the ideal organizational design for agility, which positions hierarchy as an effective structure for

achieving agility (Koçak et al., 2023). Agile approaches and bureaucracy reinforce each other, ensuring effective burden reduction. This finding offers novel insights into the evolving framework of agile bureaucracy.

Finally, our study contributes to the debate concerning the ideal organizational form for building innovative bureaucratic ecosystems in public administration, particularly in the digital era. While existing research has emphasized the roles of collaborative governance structures (Kurtmollaiev et al., 2024), innovation labs (Tõnurist et al., 2017; McGann et al., 2021), and living labs (Criado et al., 2021) in constructing these ecosystems, we extend this strand of literature by identifying agile bureaucracy as a viable organizational form. This echoes the contention that an innovative system is marked by institutional flexibility, multi-actor collaboration (Fountain, 2001), and agile stability (Drechsler, 2020; Kattel et al., 2022).

5.2. Practical implications

The practical implications of this study offer insights into the design and implementation of policies aimed at reducing administrative burdens in the digital era. While the agile bureaucracy framework is highly promising, its success is contingent upon a detailed understanding of the institutional and cultural context. This approach is particularly well-suited for addressing large-scale, wicked digital challenges rather than mature digital application contexts. In the latter, targeted strategies such as policy design or technological empowerment may prove more effective (In Appendix D, we compare the strategies for administrative burden reduction in the digital era). Therefore, rather than the indiscriminate application of existing strategies, policymakers should adopt context-specific measures tailored to the actual context to effectively alleviate administrative burdens.

Furthermore, although this study is situated within the distinctive political context of China, its findings and implications may have relevance beyond this case. The agile approaches used to mitigate administrative burdens, together with the associated facilitating and safeguarding mechanisms, reflect governance principles that may operate across different institutional settings. The synergy between agility and bureaucracy may therefore emerge in diverse bureaucratic systems, although its specific form and effectiveness are likely to vary across political regimes. In particular, the efficacy of constraint institutions, such as performance measurement systems, is shaped by politically embedded arrangements emphasizing hierarchy, loyalty, and centralized authority (Huang et al., 2026). In democratic countries, where top-down administrative mandates may be less potent, law- and market-based mechanisms may play a greater role. Accordingly, the mechanisms identified here should be treated as analytically transferable propositions rather than universally generalizable findings and require further examination through comparative research.

5.3. Limitations and future work

The limitations of this study also suggest several avenues for future research. First, evidence from a single case in China limits the broader generalizability of the findings, although the case provides analytical insight into the mechanisms of agile bureaucracy. Comparative studies across policy domains

and institutional settings are needed to assess the scope conditions and transferability of these mechanisms. Second, the study relies primarily on interview and secondary data collected through purposive and snowball sampling. These strategies enabled access to knowledgeable participants but may have overrepresented well-connected or supportive stakeholders and underrepresented dissenting experiences. The research team's involvement in participant observation and policy-related activities may also have influenced access, interactions, and interpretation. Triangulation and independent coding reduced, but could not eliminate, these risks. Future studies could combine comparative case designs, surveys, or experiments to test heterogeneous effects across citizen groups. They could also examine alternative organizational forms, including networked bureaucracy (Kanon, 2024) and digital government units (Clarke, 2020). Finally, this study focuses more on how agile bureaucracy reduces administrative burdens than on how organizations adopt agile approaches. Future research should examine the conditions under which agile methods and traditional bureaucratic structures can be integrated and sustained.

Declarations

Competing Interests

The authors declare no conflicts of interest.

Informed consent

Informed consent was obtained from all participants and/or their legal guardians.

Author Contribution

HY: Writing – review and editing, Writing – original draft, Visualization, Validation, Methodology, Data curation, Conceptualization. LS: Writing – review and editing, Resources, Supervision, Project administration, Investigation, Funding acquisition, Formal analysis, Conceptualization.

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Data Availability

All data supporting the results of this study are included in the article and its supplementary materials, specifically including the data encoding process, methods used for analysis, and other related content.

Ethics approval

This study was approved by an institutional research ethics committee. The committee name and approval number have been withheld for double-blind peer review. The full details are provided in the cover letter.

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Footnotes

1. Agile governance can be classified into three distinct levels: micro (project management), meso (organizational management), and macro (governance structure) (Tai & Awasthi, 2025). Aligning with prevailing trends in public administration research (Greve et al., 2020; Moon, 2020; Kim, 2021; Mergel, 2024; Neumann et al., 2024). We adopt a meso-level conceptualization, viewing agility as a management ideology designed to enhance organizational responsiveness and meet public demands.
2. China's taxation authorities have four tiers: State Taxation Administration, Provincial Tax Services, Municipal Tax Services, and District Tax Services.
3. To facilitate data sharing within the taxation authority, a central policy framework has been established in China. Specifically, the Law of the People's Republic of China on the Administration of Tax Collection, revised in April 2015, explicitly mandates the creation of an information-sharing system between tax authorities and other government agencies. Beyond taxation, several pivotal documents regarding data factor governance have been issued in recent years. The "Opinions of the Central Committee of the Communist Party of China and the State Council on Building a Basic Data System to Better Leverage the Role of Data as a Factor of Production" (widely known as the "Twenty Measures for Data"), released in December 2022, proposes the establishment of foundational systems for data property rights, circulation and transaction, revenue distribution, and security governance. Furthermore, the "Opinions on Accelerating the Development and Utilization of Public Data Resources", issued by the General Offices of the CPC Central Committee and the State Council in October 2024, aims to systematically expand the supply of public data by institutionalizing three utilization modes: sharing, opening, and authorized operation.

Figures

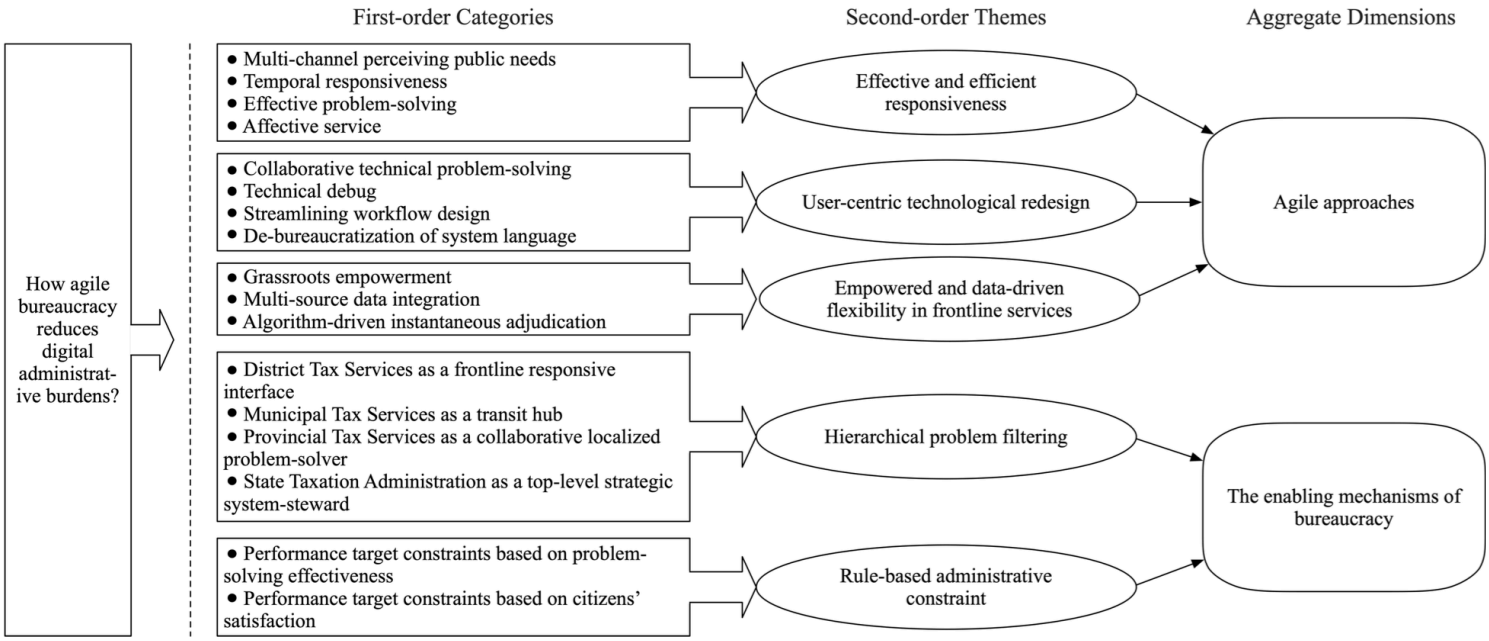


Figure 1

Data coding structure.

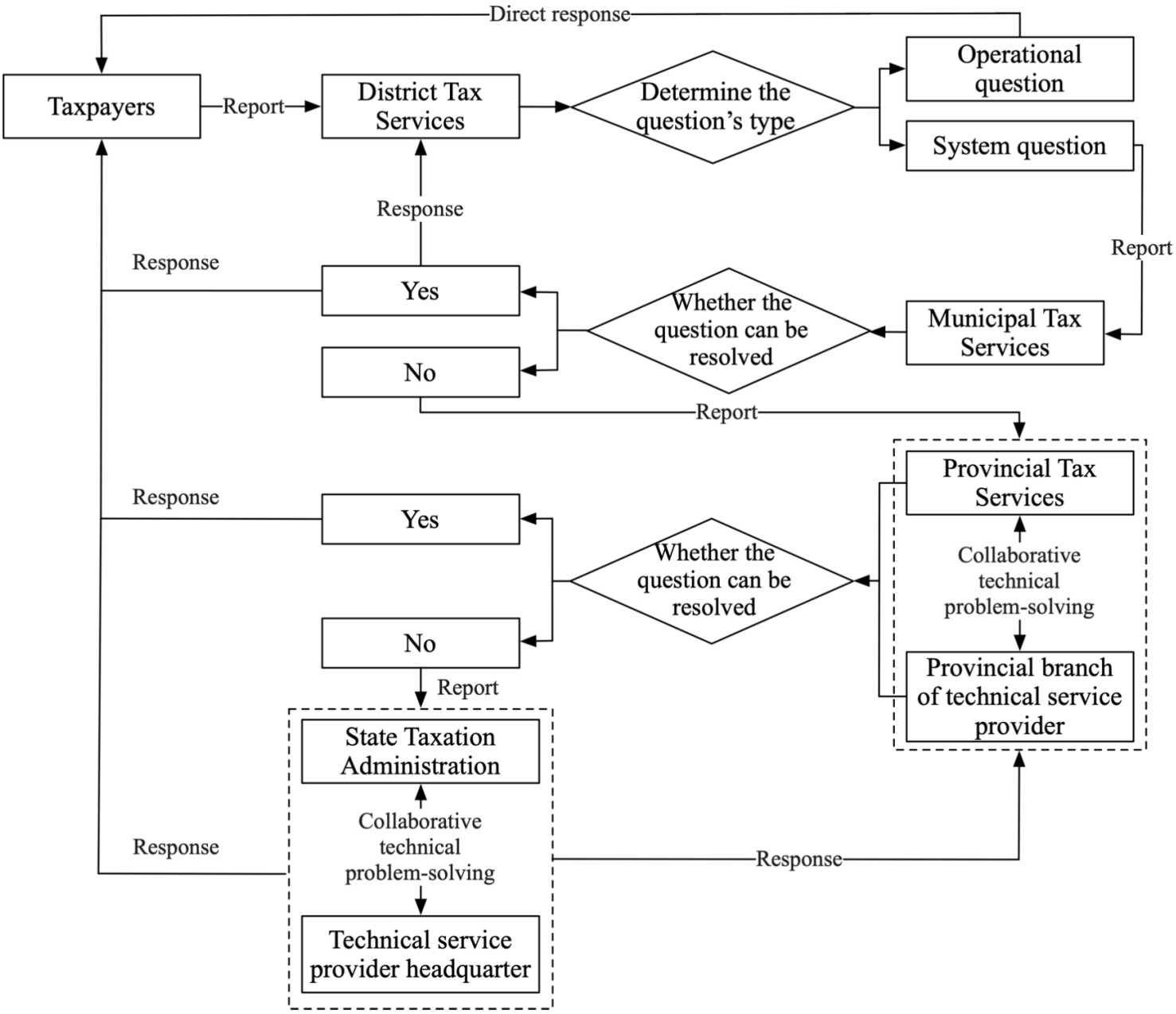


Figure 2

Four-Tier Hierarchy Agile Response Model.

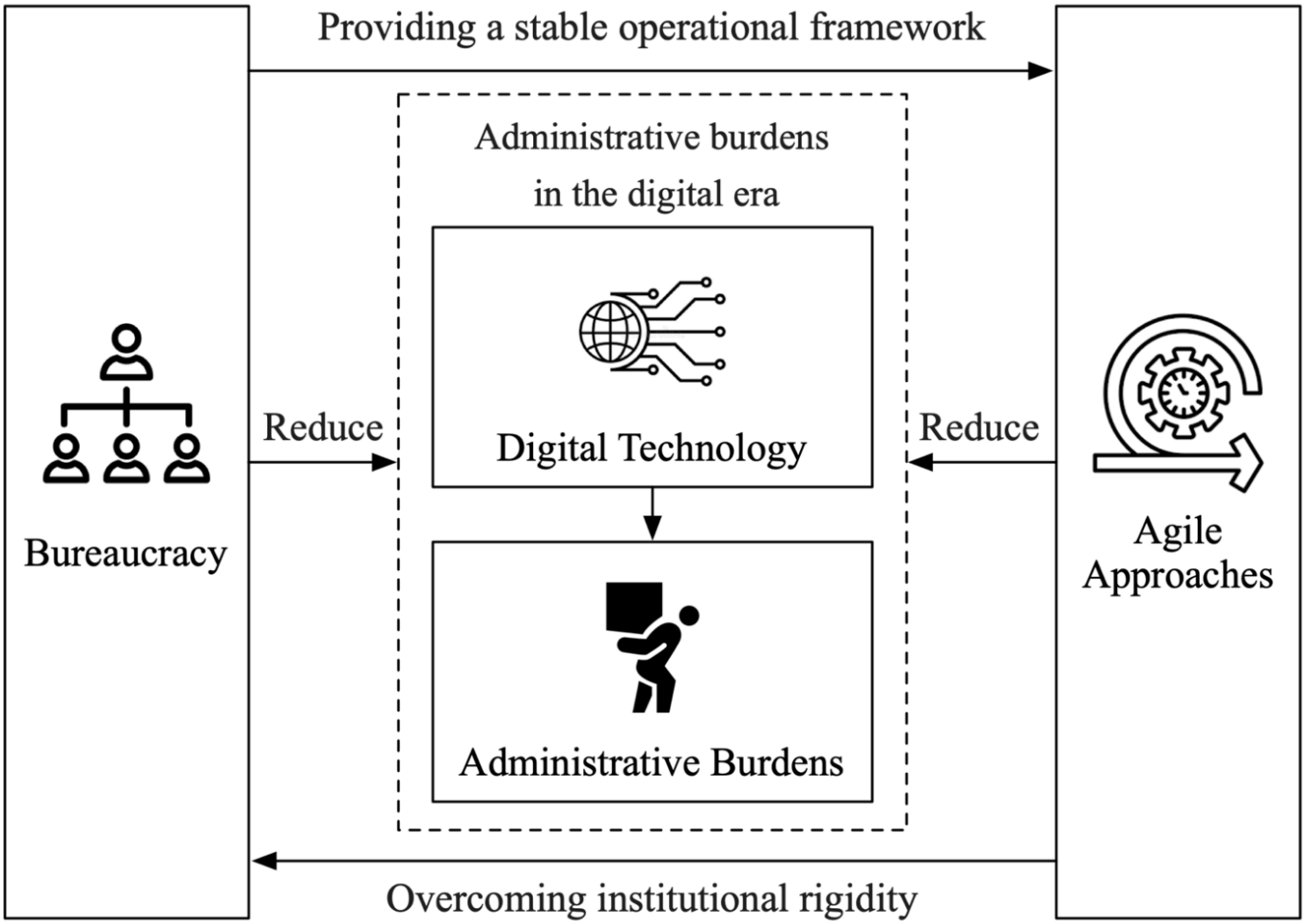


Figure 3

The mutual reinforcement and synergy between agile and bureaucracy in administrative burden reduction.

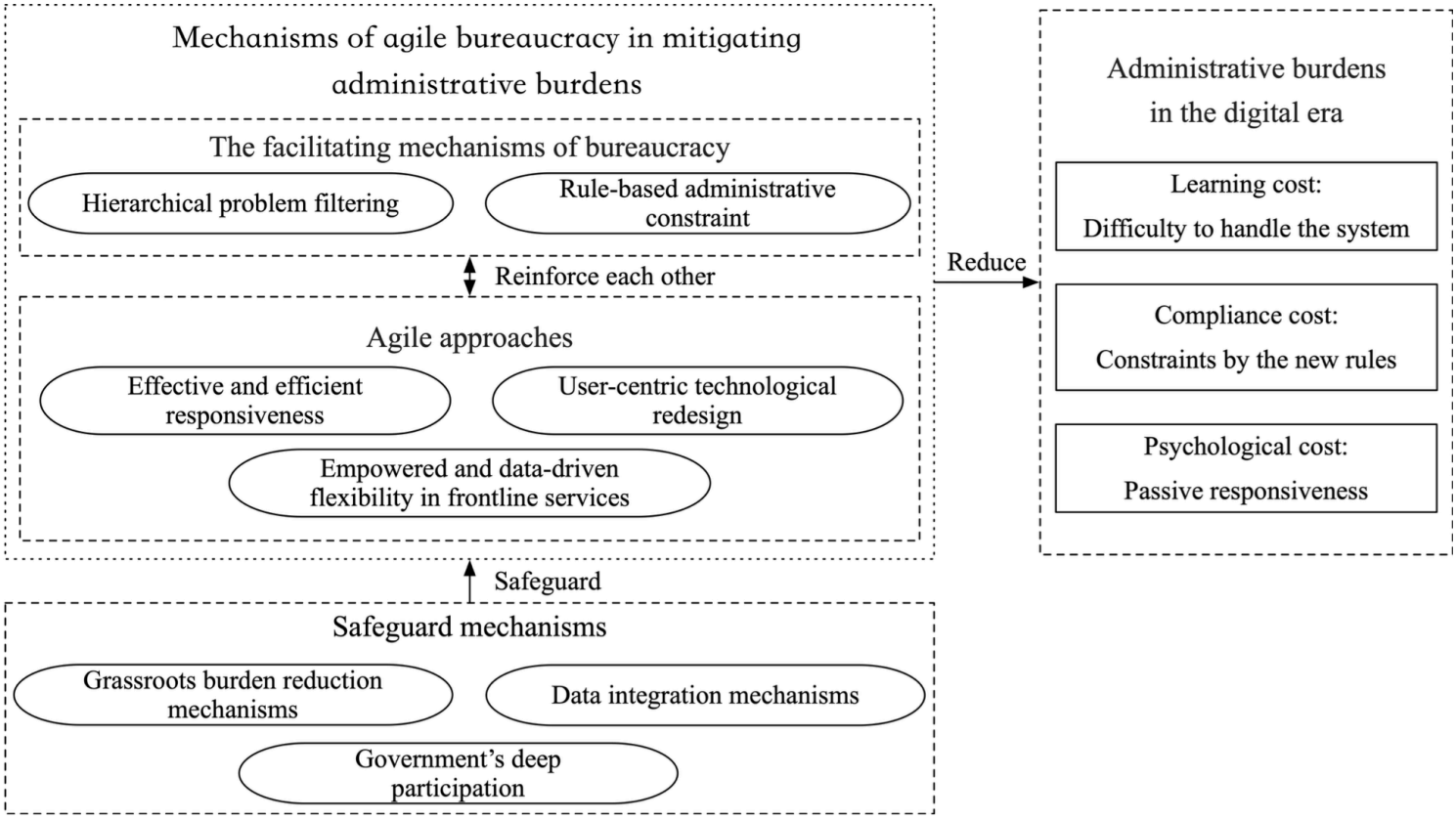


Figure 4

Mechanisms of agile bureaucracy in mitigating administrative burdens in the digital-era

Supplementary Files

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- Supplementarymaterial.docx