Precision Intelligent Control in Urban Resilience Governance: A Comparative Study of Implementation Pathways across Four Townships in Hangzhou

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Abstract: Precision Intelligent Control (PIC) connects institutional requirements, digital monitoring and feedback, and organizational coordination in local governance. This study examines how these dimensions support the continuity and adjustment of urban resilience governance. Using an Institutional-Technical-Organizational (ITO) framework, it compares four townships in one district of Hangzhou, according to policy documents, administrative records and nine retrospective interviews concerning the 2021 Spring Festival period. Three townships relied mainly on collective decision-making and coordinated implementation, while one concentrated practical decisions in a principal coordinator but relied on a wider network for execution. The comparison shows that digital information does not generate adaptive capacity by itself: feedback becomes actionable when officials with the relevant authority review implementation and coordinate changes in practice. More importantly, the comparison shows that both arrangements depend on staffing, implementation networks and access to support. The study explains PIC as a mode of urban resilience governance and suggests that its transferable value lies in linking institutional requirements, actionable feedback, decision-making authority and implementation support.

Keywords: Urban Resilience; Precision Intelligent Control; Policy Implementation; Pathway; Hangzhou

1. Introduction

Urban resilience governance is concerned with how the local systems are able to sustain their critical operations during disruption and modify their practices in response to changing circumstances [1]. This is at the local level where this is done by the way that the authorities interpret the requirements, organize staff and services, and react when there are implementation issues. Digital platforms have the potential to bring activities into view, yet their role in enhancing resilience relies on the institutional and organizational mechanisms whereby information turns into action [2].

Studies of the Chinese reaction to COVID-19 have looked into the bureaucratic structure and the relationship between information, decision-making and execution [2,3]. Research on digital governance has also been concerned with the influence of technology application, collaboration within organizations, accountability and local discretion in policy implementation [4–9]. Nevertheless, these lines of research offer a narrow account of how institutional demands, digital surveillance and organizational structures combine to create varying implementation trajectories in a common system of local governance. More studies should be conducted to clarify the ways through which digital feedback can become actionable and the allocation of decision-making responsibility influences implementation.

The Precision Intelligent Control (PIC) system in Zhejiang is an appropriate context to consider these questions. PIC links the risk information, health codes and performance monitoring with administrative coordination and policy implementation [10]. The existence of a common system does not necessarily result in similar local practices however. This paper thus compares four townships in one district of Hangzhou where the local authorities were functioning within the same provincial policy

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environment and district coordination system but took different pathways of implementation. It looks at the way institutional demands, digital surveillance and organizational structures interacted in such townships and how this interaction can be used to explain variation in PIC application.

To fill these gaps, this paper proposes an Institutional-Technical-Organizational (ITO) framework to study the operation of PIC across the four townships. It uses policy documents, administrative records and nine retrospective interviews to answer three questions: (1) How do institutional requirements, digital monitoring and organizational arrangements interact in the PIC model? (2) Why do townships operating within same policy and assessment environment follow different implementation paths? (3) What practical lessons can be drawn from these differences for the planning and implementation of local resilience governance? The study applies the ITO framework to explain PIC as a mode of urban resilience governance, identify two implementation pathways, and examine how decision-making authority, coordination and implementation support shape the translation of digital feedback into administrative action.

2. Literature Review and Theoretical Framework

2.1 Urban Resilience Governance

The urban resilience studies focus on the continuity, adaptability and change of the interconnected city systems. Recent study has suggested that the level of resilience should be identified by its scale, time frame and who it is intended to benefit [1]. According to Folke et al., there are two types of resilience, namely, adaptability and transformability [11]. These can make the local government research able to pose the question as to which activities would remain in the presence of pressure and what will happen to working practices and also ensure that the size of their findings remains clear.

At the same time, the recent research in the field of public administration is useful in making this aspect more specific. According to Li et al., the studies about maintenance, recovery, and adaptability are all connected with each other, but they have their own peculiarities, which are reflected in the evidence that was studied [12]. The difference between the policy means and changes in the policy aims are differentiated by Howlett and Ramesh [13]. In this sense it will be helpful since a place may alter its method of implementation without changing the policy itself. This is a limited, visible form of adaptation in the governance process.

In the case of local governance, it is necessary to ensure that resilience is a result of the ability of the state institutions to keep their functioning and organize the resources in accordance with the changes. These capabilities are determined by the presence of the resources as well as the formal structures but also the allocation of responsibilities and the way information is used when making administrative decisions. In this regard, the Urban resilience governance should be concerned about the relationship between institutional structure, technology provision and organizational behavior instead of treating the issue of continuity and adaptation as an outcome.

2.2 Precise Intelligent Control and Digital Governance

PIC is a combination of digital information and administrative duties. Its spatial risk, individual management records and local performance were made visible at various scales by its map, code and index elements [10]. Studies on pandemic governance focus on the relationship between information, decision-making and execution [2]. The comparison of provincial responses by Lian also focuses on the local conditions and professional capacity [4]. These studies together indicate that it would be useful to examine the practical steps between receiving information and implementing a decision.

The research on e-governance has then been focused on the relationship between the use of technology by employees and the working group. According to Bao et al., the Chinese government workers are a joint worker who will respond to an agile manner [5]. It is also in favor of paying attention to the application of a platform as an administrative one: it is necessary that the staff be able to know what record there is, assign responsibility and take action before any information can have an impact on the delivery of services. The same practice of using the information is applied in PIC where the performance of the locals is seen by the higher authorities through the system of assessment.

Performance visibility is a change of the incentives and also availability of information. Hood and Hinterleitner demonstrate the relationship between transparency and blame

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avoidance [6,7]. It has been argued that there are two other studies on selective implementation as well as county and township cadres as strategic groups which can explain the coexistence of shared administrative interests with local discretion [8,9]. These studies have combined to point out the need to consider the way in which institutional needs, digital surveillance and organizational processes will be involved in determining the nature of local governance practices.

2.3 The Institutional-Technical-Organizational Framework

Existing multi-dimensional frameworks provide important foundations for analyzing resilience, but differ in their analytical focus. Bruneau et al. [14] proposed a framework for assessing community seismic resilience across four dimensions: technical, organizational, social and economic (TOSE). The technology–organization–environment (TOE) framework, in contrast, examines how technological, organizational and environmental contexts influence technology adoption and implementation [15]. Building on these perspectives, our previous study developed an institution–technology–organization (ITO) framework to examine urban resilience governance [16]. This paper will discuss how the institutional demand, technical assistance and organizational structure are interrelated with PIC implementation and how they determine various pathways of government.

The Institutional-Technical-Organizational (ITO) framework gives the combined analytical lens for this research. Institutions spell out objectives, responsibilities and accountability requirements; technology provides records, monitoring and feedback; organization determines who interprets requirements, makes decisions, allocates tasks and acts on feedback. Even though formal rules may be common across townships, the practical assignment of decision - making responsibility can vary.

The framework follows the relationship between policy interpretation, task allocation, implementation and review. It asks what requirement applies, what information is available, who has authority to act and how action is organized. This will also allow to trace the process of the appearance of an issue of the implementation, the process of examining the procedure by the responsible officials and how the employees organize the response to this questions. The digital feedback may be used to provide a guide in implementing but the role of such feedback depends on the way it is perceived and applied in the local government organization arrangements.

2.4 Research Design and Materials

The analysis of the document and semi-structured interviews and comparative case study will be used to analyze the implementation of PIC. The four cases are the townships in one district in Hangzhou, namely A, B, C and D. They were chosen because they have differences in their central and outlying positions and population movement but they also have the same policy and coordination at the district level. It is an environment in which it can be compared on how local authorities would implement based on common policy needs.

The data include provincial policy documents, district and township administrative records, and nine retrospective interviews with frontline policy implementers. Five of the interviewees were at the district level including staff of the health bureau and the political and legal affairs office whereas one was in each of the four townships. Snowball sampling was used to recruit participants. The interviews took place between April and November 2021 and retroactively discussed implementation during the previous winter and Spring Festival period. The time taken to conduct interviews varied between 60-120 minutes. District and personal identifiers are anonymized. Interview citations have a locality identifier and the date of the interview in YYMMDD format. The four townships are identified by letters A-D and district-level interviewees are identified by letter F; e.g., A210422 is an interview in Township A on 22 April 2021.

The study is based on the comparison of policy interpretation, staffing, task allocation, digital reporting and responses to supervision. The policy documents determine the existing requirements, administrative records explain formal duties and staffing, and interviews are evidence about how decisions were made and implemented. The evidence focuses on different aspects across the four cases. Township A offers the better explanation of collective implementation and response to supervisory feedback, whereas B and C offer supporting evidence regarding collective decision-making

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and organizational coordination. Township D gives a different story of focused personal coordination and dependence on a larger system of employees and services.

3. The Institutional, Technical and Organizational Dimensions of PIC

3.1 Institutional Requirements and Local Interpretation

Local governments faced two connected demands during the Spring Festival period. They had to manage the movement of returnees and possible transmission risks, while keeping their practices aligned with changing policy requirements. Provincial documents established the broad requirements, and district authorities conveyed and coordinated their implementation. Township officials translated these requirements into concrete tasks for staff working in villages and communities.

Figure 1 presents the temporal distribution and thematic coverage of policy documents issued during the 2021 Spring Festival period. A total of 31 health policy documents were issued in Zhejiang Province during this period. There are three features to note. To begin with, the policies were aimed at controlling population movements especially in rural areas where there is a shortage of healthcare facilities and prevention capability. Second, the frequency of policy issuance and the themes addressed also changed over time. The number of policy themes was nine, and on 9 February alone, seven documents were issued. The next day was a turning point because the Spring Festival was approaching. The volume of newly issued documents reduced significantly after most migrant workers had returned. This time trend indicates the varying demands imposed on local implementers prior to and following the major season of population movement. Thirdly, the policy documents tended to set minimum requirements without explicitly stating upper limits. Such expressions as at least provided a room to the local authorities to impose more restrictions when interpreting and implementing the policies. Figure 1 therefore illustrates not only changes in policy activity but also the changing demands and interpretive space within which township officials had to organize implementation.

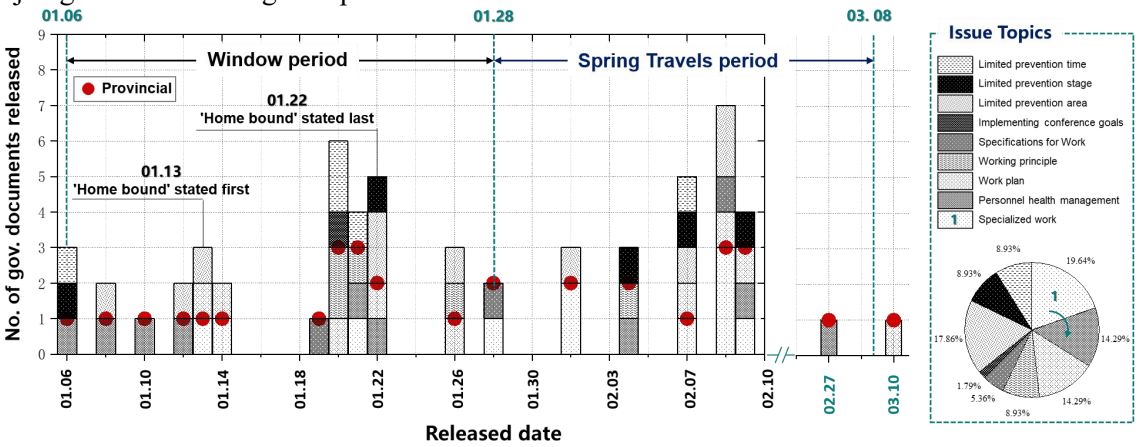

Figure 1. Policy-Document Timeline and Thematic Distribution

The source of the analysis is policy document by the authors. The documents are counted in points and stacked bars, which are thematic assignments and can be more than the number of documents due to multiple coding. The pie chart has shares of themes. The count scale was used in both series plotted.

3.2 Digital Monitoring and Feedback

PIC connected three digital functions: a map representing spatial risk, a health code supporting individual management, and an index monitoring local performance. These functions made different aspects of governance visible [10]. More specifically, the map represented geographical areas under the responsibility of county- and district-level governments, while the health code recorded residents' health status using data on population movement. The color of an individual's health code indicated different levels of risk. The index consisted of key performance indicators (KPIs) used to evaluate county- and district-level governments in their management of pandemic prevention and control. Together, these digital functions connected risk information, individual management records and administrative performance assessment.

The PIC index underwent several upgrades

alongside the normalization of pandemic control in Zhejiang. In February 2020, it consisted of two first-level indicators, the control index and the accessibility index, each accounting for 50 points. In the version 8.0 schedule adopted in April 2021, the index included four first-level assessment domains and 21 second-level indicators. Each second-level indicator was overseen by a corresponding provincial-level authority. Districts and counties within each prefecture were ranked according to their scores. These scores incorporated regular deductions issued by the relevant authorities as well as deductions based on reports from supervisory teams, which were periodically dispatched to identify implementation problems.

Within the study district, village and community staff verified information on returnees, recorded management measures and updated relevant digital records. Township personnel coordinated these tasks and checked the information reported. Digital reporting thus connected work undertaken at community level with supervision by higher authorities. It provided a means of detecting discrepancies that might otherwise remain within a locality. Performance visibility could direct attention toward activities that mattered for assessment, since completing and recording a task provided an inspectable account of local work. Officials still had to judge whether the procedure was consistent with policy and workable for staff and residents. The PIC index is therefore treated as a monitoring and feedback instrument whose practical effect depended on how organizations interpreted the information and responded to it.

Table 1 presents the version 8.0 assessment schedule in use in April 2021, comprising four assessment domains and 21 indicators, with each domain accounting for 25 of the 100 points. It associates personnel management, goods-related risks and digital control tasks with provincial evaluation bodies. This later version illustrates the organization of assessment; it does not establish the exact scoring rules used for the January episode. The schedule connects information with tasks and accountable authorities. Personnel verification requires contact with local implementers; goods-related supervision involves specialized agencies; and data sharing connects several administrative units. The mixture of procedural activities and case-detection items also means that an overall score needs interpretation. In the cases, the significant issue is how this assessment environment directed officials toward particular tasks and prompted a response when implementation attracted criticism.

Table 1. PIC Assessment Indicators in District F in April 2021

Assessment domain	Indicator	Weight	Provincial evaluation body
Domestic Personnel Control	Identification of arrivals to Zhejiang from medium- and high-risk counties	5/100	CIPPCC
	Universal vaccination	8/100	Health Commission
	Quarantine and control of risk personnel	4/100	Department of Public Security
	Testing of asymptomatic COVID-19 patients	4/100	Health Commission
	Proactive case detection	4/100	Health Commission
Inbound Personnel Control	Verification of inbound travelers linked to Zhejiang	6/100	CIPPCC
	Support for Zhejiang enterprises overseas	5/100	CIPPCC
	Entry into Zhejiang from overseas without quarantine	6/100	CIPPCC
	Quarantine and control of risk personnel	4/100	Department of Public Security
	Proactive case detection	4/100	Health Commission
Goods Risk Control	Centralized supervision of warehouse operations	5/100	Administration for Market Regulation
	Regular testing of exposed persons	4/100	Health Commission
	Traceability and coding of food products	4/100	Administration for Market Regulation
	Code scanning for business purchases	4/100	Administration for Market Regulation
	Nucleic acid testing of samples	4/100	Health Commission
	Investigation and handling of goods-related	4/100	Office for Combating Smuggling/

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	source risks		Health Commission/Administration for Market Regulation
Digital Control Capability	Sharing and integration of prevention and control data	5/100	Health Commission
	Health code application	5/100	CIPPCC
	Online service area promotion	5/100	CIPPCC
	Risk personnel data monitoring	5/100	CIPPCC
	Handling reports received through Internet + Inspection	5/100	CIPPCC

Source: District F epidemic prevention and control command documents. Version 8.0, April 2021. CIPPCC denotes the provincial epidemic prevention and control command structure. Weights are shares of the 100-point schedule.

3.3 Organizational Arrangements

The four townships formally operated through a coordination office and functional groups, commonly described as one office and ten groups. The A, B and C towns were dependent on the group decision making and implementation. Policy documents were discussed by different staffs who have various responsibilities and operational questions solved and tasks distributed. Township D was also structured formally but its day-to-day operations were centralized in a single main coordinator and the activities were scattered among the employees and services. This was the primary distinction between the two systems which is the manner of decision-making and the way of organizing the implementation processes.

These arrangements are located in the context of the relationships between provincial evaluation, district command structure and township offices and community grid as shown in Figure 2. It is a formal arrangement where there is a distinction made between leadership and control and the inspection and reassignment and concurrent appointments. Provincial supervision and local execution are connected through the district and township organizations, while grid personnel undertake work at the community level. This configuration explains why a township's response cannot be understood solely from its own internal chart: personnel, information and supervisory requirements also move between administrative levels.

Under collective decision-making, implementation generally involved interpreting policy, dividing responsibilities, refining tasks, communicating instructions to community grids, updating digital records and reviewing reported information. By contrast, under concentrated coordination, the principal implementer classified tasks by perceived importance and communicated decisions directly to relevant staff. Both arrangements depended on lower-level personnel for execution; they differed in how decisions were reached and reviewed.

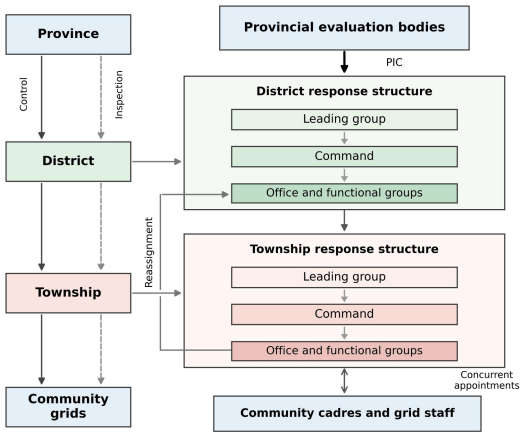

Figure 2. PIC Structure of Organizations and the Administrative Relationship

Source: Fieldwork and administrative records of the authors. CIPPCC represents the command structure of epidemic prevention and control; simultaneous appointments relate to responsibilities that are undertaken by the same personnel.

4. Comparing the Implementation Pathways of PIC

Figure 3 compares how policy requirements were received, implemented, and reviewed by the townships. In the collective pathway, policy interpretation is followed by division of labor, task refinement, grid-level execution, and reporting. In D, the coordinator classifies tasks and communicates directly with implementing staff. The feedback route documented in A shows how supervisory review can prompt officials to reconsider and adjust an existing procedure. Together, the pathways illustrate different ways of connecting decisions to implementation within a shared PIC environment.

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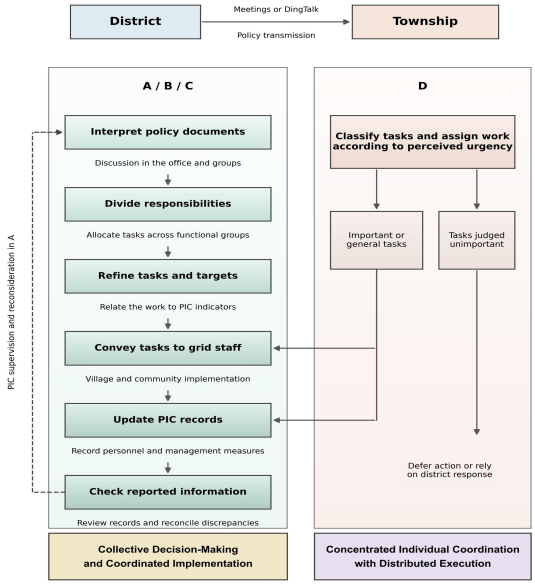

Figure 3. Decision and Implementation Processes in the Two Local Arrangements

Source: Authors' interview-based reconstruction. Solid arrows show task transmission and implementation. The dashed feedback route represents the feedback and reconsideration process documented in A (A210422).

4.1 Collective Implementation and Correction in Township A

Township A organized policy implementation through collective decision-making and coordination across functional groups. In response to provincial requirements issued in January 2021, township leaders convened a meeting to interpret the requirements and discuss their local implementation. Staff considered how general policy provisions should be translated into practical arrangements, clarified responsibilities and allocated tasks across the coordination office and functional groups. This collective process connected policy interpretation with the organization of implementation, rather than leaving individual frontline staff to interpret the requirements independently (A210422).

After responsibilities were allocated, the functional groups refined their tasks and coordinated their work. Instructions were communicated to village and community grids, where staff verified information about returnees, carried out assigned management tasks and recorded the measures taken. Township personnel coordinated these activities, checked the information reported and monitored implementation progress. The resulting process linked collective decisions with frontline execution and reporting. The division of labor and organization among the different functional groups as described by the Townships B and C (B210421; C210624) also indicate the existence of the collective decision-making and its implementation in an organization.

But the implementation of the system in township A did not follow the same pattern. It was found that there was a problem with the local practice when it came to the use of PIC and this is why the assessment of the system was made. After the criticism of the supervisors, the township authorities decided to meet again and re-evaluate the procedure as well as the manner in which they would implement the process. Then they have rearranged the order of doing things and kept the purpose of policy (A210422). The significant aspect of change was the lack of task, but the new approach to its execution after the feedback.

As Figure 3 has indicated, the procedure of the Township A included not only the general process of collective implementation but also the process of feedback and correction. The usual procedure was that policy interpretation was followed by division of labor, task refinement and grid level implementation and reporting. When a problem in the implementation arose, it was brought to the attention of the township officials as a result of the supervisory feedback. It was then discussed in a group discussion and the officials decided on the new method and implemented the same. This case demonstrates the PIC model how it related the policy needs, organizational roles and digital surveillance to practice: there was an implementation gap which was visible due to the monitoring, and the local authorities were able to make decisions and act together. The effect of the digital feedback was determined based on its relevance to the actions taken by the organization and not on the access to the digital information itself.

4.2 Individual Coordination in Township D

As a contrast, Township D did not implement the implementation in the same way as Townships A, B and C. It had an office of coordination that was formal and functional groups but most of its day-to-day decisions were centralized on one main coordinator. The coordinator understood policy requirements, determined the priority and urgency of tasks, and informed the appropriate staff about decisions. Instead of relying on collective meetings to

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address every operational question, D relied on this central coordination point to decide which tasks should be addressed immediately and how they should be done (D210624).

Figure 3 shows that the implementation process of D was more direct in its approach between policy interpretation and task prioritization to communication with implementing staff. The coordinator categorized tasks based on their perceived importance and urgency, and explicit policy requirements and activities that are evident in PIC assessment were given special consideration. The instructions were then conveyed to the appropriate personnel to implement. This structure reduced the chain of practical decision making but it did not imply that the work was done by the coordinator alone. It relied on the communication with frontline workers and their capacity to perform tasks assigned to them.

Figure 4 further clarifies the relationship between concentrated decision-making and distributed execution. The coordinator communicated directly with 31 staff members: 27 associated with village or community medical work, one from the urban construction management office and three from the regional development office. These staff provided links to wider community and grid personnel. The coordinator therefore occupied a central position in task interpretation and allocation, while implementation relied on a broader network of personnel. The distinction is important: decision-making was concentrated, but the work required to implement decisions remained distributed.

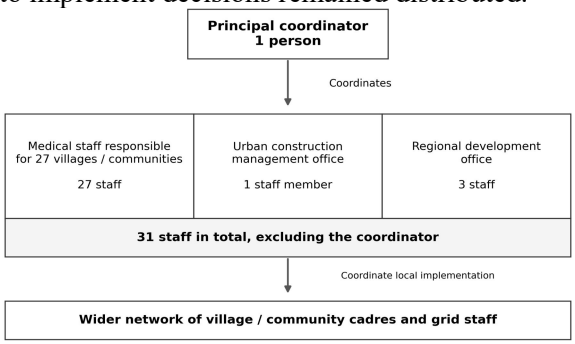

Figure 4. The Operational Staff Network in Township D

Source: Township D interview materials. The position at the top is the main organizer. Below that level, there are 31 employees as seen below, which include 27, 1 and 3 of the groups of employees with no coordinator.

D also relied on support from district-level services. The coordinator expected specialist district teams to lead certain responses when additional expertise was required, while township and community staff assisted with communication and local implementation. The coordinator also sought transport and other assistance from district health services when needed. These connections enabled D to draw on capabilities beyond its own organizational resources and reduced the range of tasks it had to arrange independently (D210624).

The case shows how concentrated coordination could sustain local implementation when the coordinator had access to information, communication channels, frontline personnel and external services. As Figure 3 indicates, the coordinator's decisions were translated into action through direct task communication and distributed execution; Figure 4 shows the personnel network that made this arrangement possible. Compared with the collective pathway in A, B and C, D relied less on joint deliberation and more on the coordinator's judgment and connections with staff and district services. Its operation therefore depended not simply on an individual decision-maker, but on the wider network through which decisions could be implemented.

4.3 Comparison of the Two Implementation Pathways

The cases show variation within a shared PIC environment. Townships A, B and C distributed policy interpretation and task allocation through collective processes, whereas Township D concentrated these functions in a principal coordinator. Both arrangements relied on community personnel and digital reporting. Table 2 compares the two implementation paths in terms of policy interpretation, task allocation, the use of PIC, adjustment and service support, and operational reliance. Evidence about adjustment following supervisory feedback is strongest in A, while D provides a detailed account of routine task selection and external support.

4.3.1 Comparing the Two Implementation Paths

The difference between the two is not only in the organization of the decision-making process, but also the way of making the decisions. The interpretation and allocation of policy was coordinated by the group of people as well as functional groups in A, B and C. In D, it was a centralized role that was given to a main coordinator whereas there were decentralized

implementation roles among staff and services. It is not about whether or not there were any formal organizational structures, but about how they made their decisions and passed them on.

It is also observed that the same PIC assessment was not an element of a common reaction. The information on assessments became one of the foundation of local decisions, though in practice it was dependent on the officials understanding the requirements and what they should do as well as how to arrange the implementation. In A, there was a reconsideration of a procedure that had already been carried out by the supervisors. In D, the coordinator was able to use the priority of tasks and other information to implement through direct contact with employees. This would suggest that the digital monitoring system worked in a different way in which each township has its own structure.

Table 2. Comparison of Local Implementation Pathways

Aspect	Collective Implementation in A, B and C	Individual Coordination in D
Interpretation	Collective discussion among responsible officials; local interpretation of policy requirements	Coordinator interprets instructions and classifies tasks
Task allocation	Functional groups and community grids; concurrent appointments connect tasks	Direct contact with 31 staff, then wider grid personnel
Role of PIC Monitoring and Assessment	Reporting and supervisory assessment; feedback followed by reconsideration in A	Priority to assessed tasks and dates recorded in PIC
Adjustment and services	A revised the procedure after supervisory feedback	D relied on district services and local implementation capacity
Operational reliance	Coordination among groups and officials able to implement a shared decision	Coordinator's judgment, community execution and district services

Lastly, the two approaches were supported by the organization. It was necessary to coordinate the collective implementation of the functions and the relationships that are established through overlapping roles. The more direct coordination of concentrated coordination was based on the personal opinion of the main coordinator, communication with the employees at the frontline as well as the availability of services in the district. The structure of decision making cannot be analyzed only according to either of these arrangements: both had to have a larger web of people involved in the process of translating the decisions into action. These differences are used to consider the possibility of shared governance aims and local level options in terms of the implementation.

4.3.2 Common Goals and Different Implementation Options

The common goals and implementation options that are found in the cases are combined in Figure 5. The formal policy goal was epidemic prevention and control whereas PIC assessment offered district and township officials a shared concern on implementation performance. These common aims linked various administrative levels, but they did not indicate a particular method of arranging local work. There were differences in the allocation of decision-making responsibility and how the officials related the requirements of assessments with existing personnel and services.

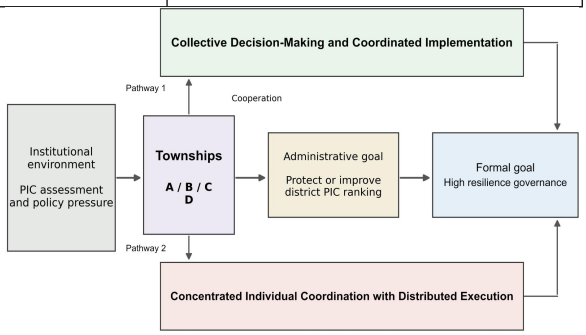

Figure 5. Common Goals and Different Local Implementation Strategies

Source: Authors' comparative case analysis. The nodes and paths describe historical administrative objectives and implementation choices.

In Townships A, B and C, collective discussion provided a way to interpret requirements, distribute responsibilities and coordinate implementation across functional groups. This arrangement linked individual decisions to a shared process, although collective caution could also shape how requirements were interpreted. In D, the principal coordinator exercised greater discretion in classifying tasks and communicating decisions, relying on frontline personnel and district services to carry them out. The contrast suggests that common performance pressures could be addressed through different organizational arrangements, depending on where practical judgment was exercised and how implementation resources were accessed.

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The comparison therefore points to the organizational mediation of PIC. Institutional requirements and performance assessment established a shared context, while digital information made aspects of implementation visible. Neither determined local action on its own. The way these pressures were translated into practice depended on decision-making arrangements, working relationships and access to implementation support. Figure 5 should thus be understood as a synthesis of the relationships observed in the cases, rather than as evidence that a single organizational arrangement necessarily produces better resilience outcomes.

This interpretation also clarifies the transferable lesson of the comparison. Other townships need not reproduce either arrangement exactly. Instead, they can consider how decision-making responsibility should be distributed, how digital feedback reaches those able to act on it, and whether the staff and services required for implementation are available. The relevant lesson is to align governance requirements, organizational responsibilities and implementation capacity, while adapting the arrangement to local conditions.

5. Discussion and Implications

5.1 How PIC Supports Urban Resilience Governance

The findings show that PIC supports local resilience governance through the interaction of institutional requirements, digital monitoring and organizational arrangements, rather than through digital technology alone. This is consistent with Bao et al.'s [5] emphasis on the joint role of technology use and group collaboration in agile e-governance. The comparison further shows that this relationship operates through different organizational arrangements: collective decision-making connects policy interpretation with shared task allocation, whereas concentrated coordination connects individual judgment with distributed execution. Digital information therefore supports implementation through the organizational arrangements that translate it into action.

The findings also extend the distinction between adjusting policy means and changing policy goals discussed by Howlett and Ramesh [13]. Supervisory feedback in Township A led to a re-examination of implementation processes whereas the policy objective remained. This demonstrates that feedback can facilitate adaptation without necessarily changing the overall policy purpose. More generally, the comparison reveals that monitoring effects are contingent on whether responsible officials are able to interpret feedback and coordinate a response. PIC's contribution to urban resilience governance therefore lies in connecting institutional requirements and digital feedback with decision-making and implementation, while allowing different organizational arrangements to operate within a shared governance environment.

5.2 Scope and Limitations of the PIC Model

The relevance of these findings is to be interpreted in the context of the empirical environment of the study. The four townships were functioning under one district of Hangzhou and had a common provincial policy framework and district coordination structure. The findings explain how PIC operated in this emergency governance context, but they do not establish that the same implementation pathways would apply unchanged to other policy areas.

One of the significant questions is whether the principles that are applied in emergency governance can be used to guide normal community governance and urban renewal. The cases suggest that the fundamental relations between institutional demands, information, decision-making and implementation could also be applicable outside the sphere of emergency response. Nevertheless, their implementation would have to take into account the nature of various tasks of governance. Community governance on a regular basis might need long term involvement of residents and constant coordination whereas urban renewal could entail longer decision making processes, varied stakeholder interests and negotiation regarding costs and benefits. These environments may thus necessitate other types of participation, feedback and organizational coordination.

The transferable value of PIC is its latent governance logic – linking institutional demands, information feedback, decision-making and organization implementation to facilitate continuity and adjustment in local governance. Such a logic can be extended to routine community governance, urban renewal, etc. However, when applied, participation, feedback and organization implementation need to be tailored to the characteristics of different

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governance tasks and evaluated in terms of their practical effects in different contexts.

5.3 Practical Implications for Local Governance

The comparison study suggests three practical priorities for local governments wanting to follow the principles of PIC:

First of all, there should be a digital monitoring that is linked to the process of re-examination and correction of implementation. In case of some information reported, which shows the discrepancy, the authority in charge must determine the applicable requirement, analyze the current procedure, explain any change and check whether it has been done or not. The limits of local discretion must also be set to make sure that changes are within the limits of the policy requirements. It is based on this recommendation because the feedback provided by supervisors resulted in the revision of the procedures but the goal of the policy remained unchanged as in the A case.

Second, it is important that the decision-making and the implementation process must be based on the local organizational potential. The functional groups can be arranged to coordinate their work with one another and a coordinator may help in organizing the routine decisions and the task distribution. There should not be any of these arrangements which are taken as a standard template. It is necessary to define the responsibility of making decisions by the local authorities, who would have to follow up, and who could provide access to people and other services. In situations where the coordination relies on a particular person too much, there can be an opportunity to keep records of the tasks and back them up.

Third, digital governance systems in the future may not only be developed to record implementation and evaluate performance but also offer a greater support in determining discrepancies and aligning responses. The PIC system that is studied in this paper represents the arrangements recorded in 2021; the cases do not define the abilities of the further versions of the system. In the future, digital systems can look into more integrated feedback capabilities, more distinct connections between identified problems and responsible departments, and improved monitoring of whether corrective measures have been implemented. This kind of development would need proper data governance, well defined roles and human review instead of assuming that technological improvements would enhance governance by themselves.

The broader lesson is that PIC should be adjusted to the evolving institutional, technological and organizational circumstances. Its usefulness in practice is not in replicating a specific version of a digital platform but rather in sustaining viable links between policy needs, information, decision-making and implementation support.

6. Conclusion

This study examined Precision Intelligent Control (PIC) through a comparison of four townships in Hangzhou, using the Institutional-Technical-Organizational (ITO) framework developed in our previous research. It demonstrates how the requirements of the institutions and the digital surveillance and organization are interrelated in their local application. The two pathways were identified as the collective decision making and implementation with a centralized coordination and distributed implementation. Such pathways were formed under a common policy and evaluation environment but the distribution of the responsibility of making decisions, translation of information into action, and support of the implementation varied. This research therefore goes beyond the digital role of PIC by providing an explanation of how it is linked to the actual activity by organizational arrangements of policy demands and data.

The research is confined to four townships in a single district of Hangzhou and the evidence will be partially based on retrospective interviews with nine implementers. The township cases offer varying degrees of information, but the existing evidence has not yet demonstrated long-term effects of either pathway or its applicability in other areas of governance. Future studies might compare PIC-related practices between regions and policy domains such as routine community governance and urban renewal and apply longitudinal data and opinions of residents and other stakeholders to investigate how these arrangements work and evolve throughout time.

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