# What Conditions, in Combination, Drive Inter-Organizational Activities? Evidence from Cooperation on Environmental Governance in Nine Urban Agglomerations in China

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**Abstract:** This study investigates what conditions, in combination, drive varying levels of intensity of inter-organizational activities regarding cooperation on environmental governance in nine urban agglomerations in China. This article distinguishes strong and weak inter-organizational activities; and through a literature review, the article distills five conditions influencing inter-organizational activity, including vertical meta-governance, horizontal meta-governance, leadership, autonomous capacity disparity and environmental status disparity. While these conditions are clearly unique, it is unclear if any of these conditions are necessary or sufficient and how they work collectively, for varying degrees of inter-organization activities. Through the method of Qualitative Comparative Analysis (QCA), the article examines this question. The findings suggest that strong horizontal meta-governance and strong leadership are both necessary conditions for strong inter-organizational involvement in joint environmental governance. Small disparities in autonomous capacity and environmental status are sufficient conditions for strong inter-organizational activities. Strong vertical meta-governance is neither a necessary nor a sufficient condition. The QCA results reveal that local authorities should put energy in developing their formal structures favorable for cooperation and that local leaders should develop skills to facilitate joint actions between member cities in an agglomeration.

**Keywords:** environmental governance; cooperation; inter-organizational activity; urban agglomeration; China

## 1. Introduction

Urban entrepreneurialism and intensive inter-city competition have featured prominently in post-reform China [1]. Because of economic decentralization, individual cities gained unprecedented autonomy in local development. Municipal governments were responsible for making comprehensive local economic plans, setting local taxation rates and leasing and granting urban land [2,3]. The purpose of these local strategies was to attract domestic and foreign investments, compete for global production materials and become places of growth engines [4]. Under economic competition, the role of state apparatuses in facilitating regional cooperation was weakened and regional coordination organizations were provided with no central power or funding resources to promote inter-city, cross-provincial or trans-jurisdictional cooperation [1].

The serious inter-city competition for economic performance has led to accelerating environmental degradation in China. Municipal governments encouraged the establishment of Township and Village

Enterprises (TVEs) within their administrative boundaries to facilitate economic growth. In a short period of time, many small and dispersive TVEs emerged, which made the municipal governments out of control in terms of obtaining complete information on pollution sources [5]. Consequently, environmental incidents occurred frequently in the reform period of China [6]. In addition, some large industrial projects with high economic payoffs and environmental risks were constructed and operated in urban areas without environmental impact assessment. Decisions of municipal governments were made toward tolerating or even protecting the polluting enterprises [7].

It is against this backdrop that the Xi's government that came to power in 2013 is making much of its commitment to reverse the trend of inter-city competition and environmental pollution. The first step by which China pursues this commitment is to establish Urban Agglomerations (UAs) in the 18th National Congress of Central Party Committee in 2013 and to urge the member cities within one agglomeration to work together to improve environmental quality in its National Plan for New Urbanization (2014–2020). The second step is to deploy the Plan for Environmental Governance System Construction, which aims to improve the rule of law and regulatory policies of environmental protection and to enhance the intensity of activities between governmental organizations to protect environment of the agglomerations [8].

Literature on environmental studies has recognized the increasing frequency of governmental organizations to engage in cooperative activities to solve environmental problems and to develop multi-level and integrative environmental policies [9,10]. Scholars have paid much attention to the conditions for effective cooperation. Although disagreement exists about the necessary conditions for effective cooperation, most frameworks include the consideration of starting conditions (e.g., power asymmetries and prehistory of cooperation or conflict between government organizations), governance (e.g., designing basic protocols and ground rules for cooperation), mutual trust and communication, perceived interdependence, shared goals and common strategy, facilitative leadership and autonomy (e.g., organizational capacity to solve problem alone) [11–16].

While elucidating conditions that underlie cooperation, the scholarship does not clarify whether all the identified conditions are necessary for varying intensities of inter-organizational activities. Bryson, Crosby and Stone [17] has pointed out this problem: "while many explanatory frameworks of [cooperation] exist, most fail to consider how elements of [cooperation] may vary based upon the degree of [cooperative] involvement." That means, the relationship between the (combination of) cooperative conditions and the varying intensities of inter-organizational activities has not been revealed yet. This study examines this question by assessing how cooperative conditions differ based on the intensity of inter-organizational activities. To do this, we first review literature about variation in inter-organizational activities and about the conditions influencing the intensity of inter-organizational activities. Second, we examine the practices of cooperation on environmental governance in nine UAs in China. We use Qualitative Comparative Analysis (QCA) to examine this question, discuss the findings and end with conclusions.

## 2. Inter-Organizational Activities as Outcomes of Cooperation

It has been widely acknowledged by scholars that measuring and assessing the effectiveness of cooperation is a difficult task, generally because traditional measures used for evaluating organizational effectiveness are no longer adequate due to the existence of multiple organizations and diverse goals and interests and the requirements of substantial resource input and new ways of working [18–20]. Koppenjan [20] proposes "goal intertwinement" to be a possible evaluation measure: "to what extent do outcomes of cooperative processes intertwine actors' diverging objectives and/or reduce or compensate the costs and negative side-effects of cooperation." Goal intertwinement and compensation are also referred to as win–win or Pareto optimal solutions. But new problems emerge as to the difficulties of measuring goal intertwinement and quantifying invisible costs and benefits of the actors involved. Page et al. [21] offer a different perspective of assessing cooperative effectiveness. Their assessment framework focuses on the creation of public value in terms of three aspects: democratic accountability,

procedural legitimacy and substantive outcomes. Silvia [18] comments on this framework that although its power is in its comprehensiveness, it is admittedly complex and the risk is still there regarding the fact that focusing on some aspects of public value at the expense of ignoring others may lead to faulty conclusions regarding the effectiveness of cooperation.

Considering the difficulties and contentions of measuring goal intertwinement and public value in the evaluation of cooperation, Sedgwick [22] looks at inter-organizational activities as outcomes of cooperation. Inter-organizational activities are interactions between a set of interdependent actors in a specific policy field. In line with this view, one may assess the effectiveness of cooperation by looking at what the involved actors did and how they interacted. As Koppenjan [20] and Mandell and Keast [23] already implicitly mentioned, interactions between cooperative actors range from more shallow forms (e.g., cooperation about drinking cups of tea) compared with deeper forms (e.g., cooperation about creating joint processes or new organizational configurations). Thus, it is often assumed that cooperation is more effective when the cooperative actors achieve more deeper forms and higher intensity of inter-organizational activities [24].

This study follows in the approach by Sedgwick [22] and acknowledges that inter-organizational activities are concrete outcomes of cooperation; and that the intensity of inter-organizational activities is a manifestation of effective cooperation. To specify variation in inter-organizational activities, this study adopts the framework by Mandell and Keast [23], which distinguish three levels of intensity of the inter-organizational activities.

In Keast et al.'s framework, the lowest level of cooperation is conceptualized as representing the starting point or the base level of intensity of inter-organizational activities [25]. To achieve the lowest level, organizations merely need to share information with one another. The information-sharing activities aim at reducing the substantive complexity of the joint problem facing the multiple organizations, including mutual recognition between correlated organizations, awareness of plurality of perceptions and data sharing and knowledge exchange [23,26]. From this perspective, the lowest level of cooperation does not require a great deal of effort or loss of autonomy [27].

The medium level of cooperation is conceptualized as representing as having a very instrumental function [28]. It has a strong task orientation and it is about cooperative process requiring organizations to work together via already established joint goals and more structured mechanisms [27]. Therefore, in relations with a medium level of cooperation, organizations not only share information but also use strategies and exchange resources to make joint goals, plans and decisions. The organizations remain their identities and main functions separate from one another but their missions and goals are reviewed for compatibility. The purpose of the medium-level cooperation is to reduce strategic complexity of problem resolution, including goal alignment and searching for a common ground for working together.

The highest level of cooperation is conceptualized as representing the greatest frequency of the intensity of inter-organizational activities and it requires much closer relationships and connections [16,25]. For endeavors to achieve the highest level of cooperation, the organizations need not only to share information and align goals and strategies but also to change substantially in their ways of working and thinking. That means, they need to change their routines and operating procedures. More preferably, the organizations need to form into some new institutions and organizational configurations. That said, the organizations cannot maintain their individual identities but engage in new commitments. The purpose of the highest-level cooperation is to reduce the institutional complexity of public problems crossing sectorial or organizational boundaries, including designing institutional and organizational arrangements, changing rules of interactions and even trust-building.

## 3. Conditions for Inter-Organizational Activities

Although scholars have developed comparable theoretical arguments, the terminologies used to depict the conditions for inter-organizational activities and predict the effectiveness of cooperation

are far from standardized. In this article, we conduct an extensive literature review on cooperation in general and on interagency cooperation, inter-governmental relations and organizational science. We start with five comprehensive frameworks on cooperation: Bardach [14]; Ansell and Gash [11]; Daley [29]; Bryson, Crosby and Stone [12] and Emerson, Nabatchi and Balogh [30]. These five frameworks, which published on most influential journals and highly cited articles, seek to provide individual explanations for the differential success of cooperative arrangements and identify conditions for qualities that contribute to successful cooperation. We then examine the rest of the literature on governance theory, organizational theory and environmental management to refine the conditions in the five frameworks and to add some missing ones. Finally, we ended up with five conditions for inter-organizational activities to be discussed in more detail in the remainder of this section. These conditions include vertical meta-governance, horizontal meta-governance, leadership, autonomous capacity disparity and environmental status disparity. These conditions are relatively static elements in the modeling of cooperation. In other words, we assume that the statuses of these conditions remain the same during cooperation of environmental governance in UAs. We do not consider dynamic conditions in our models, such as trust-building and learning which keep change constantly in cooperation as the involved actors interact. This is partly because these dynamic conditions lack explicit or direct measurements and partly because the method (QCA) we use does not allow us to conduct a dynamic analysis.

*3.1. Vertical Meta-Governance*

Much of the literature notes that the effectiveness of cooperation on environmental governance depends on meta-governance [31–33]. It refers to some structuring force and steering efforts needed for cooperation to occur and to proceed [34–36]. The literature distinguishes two forms of meta-governance: vertical and horizontal. Vertical meta-governance stems from state intervention to coordinate the cooperative process [37,38]. The state acts as a third party to the cooperation, using mandates and regulatory instruments to resolve conflicts and mediate actions among the government organizations at subnational levels. In this situation, the cooperation may be operated by "state hegemony" [39] or in the shadow of hierarchy [40]. Vertical meta-governance usually happens at the initial stage of cooperation building (e.g., the state pulling in necessary organizations to raise perceived interdependence).

*3.2. Horizontal Meta-Governance*

Horizontal meta-governance refers to self-organizing mediation and facilitation efforts carried out at the organizational level [37,41]. Under such circumstances, meta-governance is arranged by the involved organizations at the same authority level. The purpose of horizontal meta-governance is to establish some mutually acceptable and formal cooperation mechanisms. Ansell and Gash [42] suggest that "platforms" are effective vehicles to build up formal cooperation mechanisms. A platform is a kind of formative context, in which partners are equal and highly decentralized and that provides a framework (e.g., designed rules that standardize interfaces and communication protocols) upon which and through which inter-organizational activities may be organized. The framework is relatively stable over time but the activities may be easily and flexibly organized and reorganized; and the framework is not merely a passive support structure but an enabler for reconfiguration [43]. Therefore, the use of platforms and other forms with similar functions (cf. Emerson and Nabatchi [44]) reflects the sense that it is a foundation that intermediates between organizations and upon which cooperation can be built and proceed.

*3.3. Leadership*

Vertical and horizontal meta-governance are formal ways of facilitating inter-organizational activities. Apart from these formal channels, literature also proposes some informal way of facilitation. Ansell and Gash [11] suggest that organizational leadership is a critical factor influencing cooperation: "efforts and abilities of the top leaders are essential to bring parties to the table and to steer them

through the rough patches of the [cooperative] process." It is also called "assisted negotiation", emphasizing the role of leaders in using the interventionist mediation techniques in situations that multiple organizations are unable to directly cooperate (also see Daley [16]; Huxham [15]).

### 3.4. Autonomous Capacity Disparity

While organizations' cooperative capacity is necessary for inter-organizational activities to happen and to proceed, literature recognizes that organizations' autonomous capacity in solving the problem at hand is also paramount for successful cooperation [13]. If the multiple organizations involved in the cooperative relationship have relatively equal autonomous capacity to manage the environment (for instance, they spend equal resources and efforts to make implementation plans for environmental protection), it is often assumed that their cooperation would go smoothly. By contrast, imagining the situation that some organizations make great efforts in managing the environment while their cooperators not, it is easy to predict failure of the cooperation. The concept of "autonomous capacity disparity" used in this study is similar with "power disparity" in literature studying effective cooperation where power disparity is seen as a disabler of cooperation [15].

### 3.5. Environmental Status Disparity

In the specific research field of cooperation on environmental governance, a condition of "environmental status disparity" is critical for successful cooperation to solve regional environmental problems. Literature on cooperation emphasizes the importance of "prior problem situations" or "starting/initial conditions" in driving or blocking cooperation and argues that a large disparity in problem situations of the potential cooperators provides constraints on participation into cooperation [11,12]. In a similar logic as the autonomous capacity disparity, if the environmental situations of some localities are much server than those of others in the urban agglomeration, then localities with better environmental conditions will be reluctant to cooperate with those with worse conditions, because it implies the former needs to invest more than usual to manage the environment at the scale of urban agglomeration.

## 4. Cases, Methods and Materials

### 4.1. Introduction to the Nine Urban Agglomerations in China

Based on the National Plan for Main Functional Areas published in 2011 and the National Plan for New Urbanization launched in 2013, China has established 20 urban agglomerations (Figure 1), among which 5 UAs are classified as national key agglomerations (including Yangtze River Delta, Pearl River Delta, Beijing-Tianjin-Hebei, Middle Yangtze River and Chengdu-Chongqing), 9 developing agglomerations (including Harbin-Changchun, South Central Liaoning, Shandong Peninsula, Yangtze and Huai Rivers, Central Plains, West Bank of Straits, Central Shaanxi, North Gulf of Guangxi and North Slope of Tianshan) and 6 pending construction agglomerations (including Central Shanxi, Lanzhou-Xi'an, Inter-Mongolia-Shaanxi, Central Yunnan, Central Guizhou, Ningxia). In this study, we select 9 UAs as our cases. They include the 5 national key agglomerations and 4 out of the 9 developing agglomerations that are located in Eastern coastal areas in China and that are the most prosperous regions in developing agglomerations. The contextual situations of our 9 UA cases are shown in Table 1.
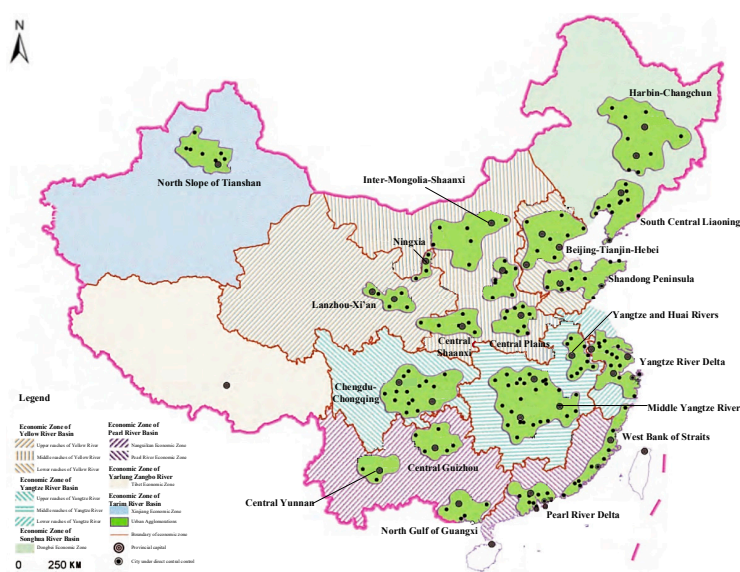
**Figure 1.** Spatial structure of urban agglomerations in China (adapted from Fang [45]).

**Table 1.** Contextual situations of the urban agglomerations in our case studies.

| River Basin | Economic Zone | Name of UA | No. of Cities | Main Interacting Cities/Provinces | GDP per Capita (Yuan) |
|---|---|---|---|---|---|
| Pearl River | Pearl River Delta Economic Zone | Pearl River Delta (PRD) | 14 | Guangzhou, Shenzhen | 16,110 |
| Yangtze River | Upper Reaches of Yangtze River Economic Zone | Chengdu-Chongqing (CY) | 16 | Sichuan, Chongqing | 6261 |
| | Middle Reaches of Yangtze River Economic Zone | Middle Yangtze River (MYR) | 31 | Wuhan, Changsha | 10,228 |
| | Yangtze River Delta Economic Zone | Yangtze River Delta (YRD) | 26 | Shanghai, Jiangsu, Zhejiang, Anhui | 13,807 |
| Yellow River | Bohai Sea Ring Economic Zone | South Central Liaoning (SCL) | 9 | Shenyang, Dalian | 7096 |
| | | Beijing-Tianjin-Hebei (BTH) | 14 | Beijing, Tianjin, Hebei | 8997 |
| | | Shandong Peninsula (SP) | 8 | Jinan, Qingdao | 10,086 |
| Songhuajiang River | Dongbei/Northeast Economic Zone | Harbin-Changchun (HC) | 11 | Harbin, Changchun | 6560 |
| Taiwan Strait | Economic Zone of the West Bank of the Strait | West Bank of Strait (WBS) | 20 | Fuzhou, Xiamen, Wenzhou | 7123 |

*4.2. Qualitative Comparative Analysis (QCA) and Operationalization*

The purpose of this article is to examine the causal relationship between cooperative conditions and intensity of inter-organizational activities regarding environmental governance in the selected 9 UAs in China. In order to do so, the method of QCA developed by Charles Ragin [46,47] is used. As a QCA expert who frequently applies QCA in social sciences, Fritz Sager [48,49] explains: "QCA, unlike statistics, is not based upon variance, yet still presents multivariate explanations for outcomes. It does so by using Boolean algebra, that is, the logic of the binary system. In this system, the logic operator 'or' is used in additions and the logic operator 'and' is used in multiplications." For this study, the intensity of inter-organizational activities is considered the outcome and the cooperative conditions are examined as potential causal conditions. The technique handles causal complexity and focuses on comparing subset relationships between conditions and an outcome. We used fsQCA software [50] to perform one of the types of QCA—a crispy-set analysis. For crispy set, conditions and the outcome are dichotomized into "absent" or "present" to conform to a "0" or "1" coding necessary for Boolean logic.

To operationalize the outcome variable, the intensity of inter-organizational activities, we adopt our framework discussed in Section 2 to distinguish three increasing levels of intensity of inter-organizational activities. Regarding the conditional variables, we use the various definitions of the cooperative conditions in Section 3 as the basic measurement guidance. The detailed criteria to measure the outcome and conditional variables are offered in Table 2.

**Table 2.** Operationalization and measurement of outcome and conditional variables.

| Variable | Variable Name and Definition | Measurement Criteria | Symbol of Criteria |
|---|---|---|---|
| Outcome variable | The lowest level: information sharing and data transparency | (1) whether the city/province has basic environmental information disclosure (e.g., environmental pollution status and data). | LL1 |
| | | (2) whether the city/province publishes the detection and control situations of key pollution sources. | LL2 |
| | | (3) whether the city/province discloses the information on administrative penalties of environmental pollution. | LL3 |
| | The medium level: formulating common goals, joint enforcement actions and applying accordant environmental standards | (1) whether the participating cities/provinces establish common goals. | ML1 |
| | | (2) whether the participating cities/provinces conduct joint environmental law enforcement. | ML2 |
| | | (3) whether the participating cities/provinces implement accordant environmental standards. | ML3 |
| | The highest level: establishing platforms, taskforces or new organizations for economic, social and particularly environmental development. | (1) whether the participating cities/provinces establish platforms for economic and social development. | HL1 |
| | | (2) whether the participating cities/provinces establish platforms, taskforces or new organizations for cooperation on environmental governance. | HL2 |
| Conditional variable | Vertical meta-governance: State intervention by central planning and mediation efforts. | (1) whether the regional developmental plan is incorporated into the national five-year plan. | VG1 |
| | | (2) whether the national-level governments enact specific developmental plan for the agglomeration. | VG2 |
| | | (3) whether the national-level governments enact environmental plan for the agglomeration. | VG3 |
| | | (4) whether the national-level governments intervene to mediate inter-city/province environmental conflicts. | VG4 |
| | Horizontal meta-governance: formulating inter-city plans, agreements and making efforts to push the plans and agreements. | (1) Whether the participating cities/provinces sign inter-city economic agreements. | HG1 |
| | | (2) Whether the participating cities/provinces formulates developmental plans for the agglomeration. | HG2 |
| | | (3) Whether the participating cities/provinces sign inter-city environmental agreements. | HG3 |
| | | (4) Whether the participating cities/provinces make efforts to push cooperation. | HG4 |
| | Leadership: deploying joint meetings or forums for inter-leader communication and negotiation. | (1) Whether there exist joint meetings or forums between major leaders of the participating cities/provinces regarding cooperation on economic affairs. | LS1 |
| | | (2) Whether there exist joint meetings or forums between major leaders of the participating cities/provinces regarding cooperation on environmental affairs. | LS2 |
| | Autonomous capacity disparity: existing a difference in the frequency of formulating autonomous working plans between participating cities. | (1) Whether the participating cities/provinces have their own working plans to control environmental pollution. | AC1 |
| | | (2) Whether there exists a disparity of frequency at which the participating cities/provinces issue their own working plans. | AC2 |
| | Environmental status disparity: existing a difference in the environmental status between the participating cities. | (1) Whether there exists a disparity of air quality between the participating cities/provinces. | ES1 |
| | | (2) Whether there exists a disparity of water quality between the participating cities/provinces. | ES2 |

## 4.3. Data Collection, Analytical Logic and Coding

To conduct the QCA, we need to collect qualitative and quantitative data to code the various criteria for the outcome variable and the conditional variables (listed in Table 2). In this study, the qualitative data include past actions taken by the governmental organizations within the

participating cities/provinces and the historical events occurred in the participating localities. The quantitative data include environmental statistical data published on local environmental bureaus and statistical bureaus. Our sources of qualitative data include web pages, media reports, academic papers, various types of documents produced by the multiple organizations involved in environmental protection in China. The main webpages we searched include open information platforms of each involved governmental organizations. In addition, we used baidu.com as the main search engine to find webpages outside the governmental organizations. For media reports and academic papers, we used CNKI.net to collect event data. CNKI (China National Knowledge Infrastructure) contains information generated from scientific research, newspapers, conferences and statistics yearbook. For the government documents, we went to the electronic resource platforms of the nation's archives for the past decisions made as to environmental management.

Based on the collected data, our analytical/decision logic is shown in Table 3. As can be seen, the outcome variable, the intensity of inter-organizational activities, is broken into two categories: weak intensity of inter-organizational activities when the data support LL1, LL2, LL3, and/or ML1; and strong intensity of inter-organizational activities when the data support ML1, ML2, ML3, and/or HL1, and/or HL2. After this step, the next is to assign "present" versus "absent" to the variable. For this outcome variable, "1" is assigned to strong inter-organizational activities and "0" is assigned to weak inter-organizational activities. We apply the same coding logic to the conditional variables. Taking vertical meta-governance (VG) as an example, VG is broken into strong VG and weak VG. If our data support VG1 and/or VG2, then VG is weak and we assign "0" to this conditional variable; if our data support VG1, VG2, VG3, and/or VG4, then VG is strong and we assign "1" to this variable. We code other conditional variable using the same logic discussed above. The coding results for the variables are summarized in Table 4.

**Table 3.** Decision logic for the criteria of the outcome and conditional variables.

| Variables | Criteria | Decision Logic | Criteria Attributes | QCA Condition Threshold |
|---|---|---|---|---|
| The lowest level | LL1 | If yes to LL1, LL2, LL3, and/or ML1 | Weak intensity of inter-organizational activities | 0 |
| | LL2 | | | |
| | LL3 | | | |
| The medium level | ML1 | If yes to ML1, ML2, ML3, and/or HL1, and/or HL2 | Strong intensity of inter-organizational activities | 1 |
| | ML2 | | | |
| | ML3 | | | |
| The highest level | HL1 | | | |
| | HL2 | | | |
| Vertical meta-governance | VG1 | If yes to VG1 and/or VG2 | Weak vertical meta-governance | 0 |
| | VG2 | | | |
| | VG3 | If yes VG1, VG2, VG3, and/or VG4 | Strong vertical meta-governance | 1 |
| | VG4 | | | |
| Horizontal meta-governance | HG1 | If yes to HG1, and/or HG2 | Weak horizontal meta-governance | 0 |
| | HG2 | | | |
| | HG3 | If yes HG1, HG2, HG3, and/or HG4 | Strong horizontal meta-governance | 1 |
| | HG4 | | | |
| Leadership | LS1 | If yes to LS1 | Weak leadership | 0 |
| | LS2 | If yes to LS1 and LS2 | Strong leadership | 1 |
| Autonomous capacity disparity | AC1 | If no to AC1, or yes to AC2 | Large autonomous capacity disparity | 0 |
| | AC2 | If yes to AC1 and no to AC2 | Small autonomous capacity disparity | 1 |
| Environmental status disparity | ES1 | If yes to ES1 and/or ES2 | Large environmental status disparity | 0 |
| | ES2 | If no to AC1 and AC2 | Small environmental status disparity | 1 |

**Table 4.** Coding results for QCA.

| Urban Agglomeration | VG | HG | LS | AC | ES | Intensity of Inter-Organizational Activities |
|---|---|---|---|---|---|---|
| PRD | 0 | 1 | 1 | 1 | 0 | 1 |
| CY | 0 | 1 | 0 | 0 | 1 | 0 |
| MYR | 0 | 1 | 1 | 0 | 1 | 1 |
| YRD | 1 | 1 | 1 | 0 | 0 | 1 |
| SCL | 0 | 0 | 0 | 1 | 0 | 0 |
| BTH | 1 | 1 | 1 | 1 | 0 | 1 |
| SP | 0 | 1 | 0 | 1 | 1 | 0 |
| HC | 0 | 0 | 1 | 1 | 1 | 0 |
| WBS | 1 | 0 | 0 | 0 | 0 | 0 |

## 5. Empirical Findings

### 5.1. Result for Strong Inter-Organizational Activity

The first analysis explores the five conditions discussed in Section 3 as causal conditions for strong inter-organizational activity. The solutions have both strong consistency and coverage, which are important in assessing the parameter of fit of the overall causal paths. Solution consistency indicates that percentage of cases that display the outcome when the causal paths are present [47]. In our study, we obtain a solution consistency of 100%, meaning that the outcome (strong inter-organizational activity) is always present for the cases that display the produced paths. Path consistency measures the percentage of cases that display the outcome when the path is present. For our study, all the produced paths have individual consistency scores of 1.0.

Solution coverage indicates the percentage of cases with strong inter-organizational activities that are explained by the paths provided [48]. In this study, we obtain a solution coverage of 100%, meaning that the presence of strong inter-organizational activity is completely explained by the paths provided. Unique coverage identifies the extent to which the outcome is uniquely explained by each path. Higher unique coverage means less overlap between paths; lower unique coverage means more overlap between paths. Figure 2 displays the result of the causal conditions for strong inter-organizational activity.

```
Model: Intensityofinter-organizationalactivities = f(VG, HG, LS, AC, ES)
Algorithm: Quine-McCluskey

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1
consistency cutoff: 1
Assumptions:
VG (present)
HG (present)
LS (present)
~AC (absent)
~ES (absent)

                  raw         unique
                  coverage    coverage    consistency
                  ----------  ----------  ----------
HG*LS*~ES         0.75        0.5         1
HG*LS*~AC         0.5         0.25        1
solution coverage: 1
solution consistency: 1



Cases with greater than 0.5 membership in term HG*LS*~ES: PRD (1,1),
   YRD (1,1), BTH (1,1)
Cases with greater than 0.5 membership in term HG*LS*~AC: MYR (1,1),
   YRD (1,1)
```

**Figure 2.** Causal combinations for strong inter-organizational activities.

The result produces two paths. The first path is "HG*LS*~ES." It denotes a combination of causal conditions, including strong horizontal meta-governance, strong leadership and small environmental status disparity. This path is perfectly consistent and uniquely explains 50% of cases that have strong inter-organizational activities. The second recipe is "HG*LS*~AC." It represents those cases that strong inter-organizational activities are led by a combination of causal conditions, including strong horizontal meta-governance, strong leadership and small autonomous capacity disparity. This second path is also perfectly consistent and has a unique coverage score of 25%.

Based on the above discussion, the examination of necessary conditions (a condition is defined as necessary if it must be present for an outcome to occur) reveals that strong horizontal meta-governance and strong leadership are both necessary for strong inter-organizational activity, because these two conditions are included in both paths provided. Therefore, the overall path for strong inter-organizational can be rewritten as (according to Boolean logic language, logical AND is written with a "*" and logical OR is written as a "+"):

$$HG*LS(\sim ES + \sim AC) \rightarrow \text{strong inter-organizational activity}$$

This overall path implies that strong inter-organizational activity needs to build upon the presence of strong horizontal meta-governance and strong leadership and the presence of either small environmental status disparity, or small autonomous capacity disparity.

### 5.2. Result for Weak Inter-Organizational Activities

In addition to the analysis of the causal conditions for strong inter-organizational activity, we also conduct an analysis for the outcome of weak inter-organizational activity. For this analysis, three paths are generated. The overall solution consistency and solution coverage are very strong, both at 100%. These measurements indicate that whenever the paths are present the outcome is also present and the reverse is also true (Figure 3).

```
Model: ~Intensityofinter-organizationalactivities = f(VG, HG, LS, AC, ES)
Algorithm: Quine-McCluskey

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1
consistency cutoff: 1
Assumptions:
~VG (absent)
~HG (absent)
~LS (absent)
AC (present)
ES (present)
                    raw          unique
                    coverage     coverage     consistency
                    ----------   ----------   ----------
~HG*~LS             0.4          0.4          1
~VG*~LS*ES          0.4          0.4          1
~VG*~HG*AC*ES       0.2          0.2          1
solution coverage: 1
solution consistency: 1



Cases with greater than 0.5 membership in term ~HG*~LS: SCL (1,1),
  WBS (1,1)
Cases with greater than 0.5 membership in term ~VG*~LS*ES: CY (1,1),
  SP (1,1)
Cases with greater than 0.5 membership in term ~VG*~HG*AC*ES: HC (1,1)
```

**Figure 3.** Causal combinations for weak inter-organizational activities.

The first possibility of the occurrence of weak inter-organizational activity (i.e., ~HG*~LS) is caused by a combination of weak horizontal meta-governance and weak leadership. The second possibility leading to weak inter-organizational activity is a combination of conditions including weak vertical meta-governance, weak leadership and large environmental status disparity (i.e., ~VG*~LS*ES). The third combination of conditions include weak vertical meta-governance, weak horizontal meta-governance, large autonomous capacity disparity and large environmental status disparity (i.e., ~VG*~HG*AC*ES). The consistency for individual path is all 100%; the unique coverages of the first and the second paths are both 40%, while the score for the third path is 20%.

The three paths mentioned above do not generate necessary conditions for the occurrence of weak inter-organizational activity. This implies that there is not any condition whose presence or absence is necessary for the failure of strong inter-organizational activity.

*5.3. Interpretation of the Results*

Table 5 summarizes the results of our QCA analysis. An essential question is how to interpret the results for strong and weak inter-organizational activities. The findings presented in Sections 5.1 and 5.2 update our understanding of the conditions for inter-organizational activity listed in Section 3. First, to achieve strong inter-organizational activities, the urban agglomerations have to exhibit strong horizontal meta-governance, strong leadership and weak environmental status disparity. In our cases, three urban agglomerations (PRD, YRD and BTH) belong to this path. In the PRD case, Guangzhou, Shenzhen and other smaller cities in the region made great horizontal mediation and facilitation efforts to formulate the Outline of the Reform and Development Plan for Pearl River Delta in 2009, which was first followed by the Development Plan for Urban Integration in PRD and then by several important inter-city agreements on environmental governance (including the Regional Cooperation Agreement on Environmental Protection, Working Plan for Environmental Monitoring under Cooperation on Environment Governance, Working Agreement on Joint Prevention and Treatment of Motor Vehicle Emission, Framework Protocol for Response of Environmental Emergencies and Integrated Protocol for Water Quality Monitoring on Transboundary Rivers). Apart from these formal inter-city agreements, city leaders in PRD established the Mayoral Association Meeting System, the Joint Meeting of Environmental Protection Task Force and the Joint Meeting of Water Environment in PRD, in order to facilitate inter-leader communication and mutual understanding. The performance on the three conditions in YRD and BTH are similar. The member cities within YRD have signed formal joint agreements and contracts to specify common goals, strategies and visions regarding economic development and environmental protection. Moreover, the member cities in YRD have established informal communication mechanisms between main leaders, like Major Leader Forum, Joint Meeting on Cooperation and Development and Joint Meeting on Environmental Protection Collaboration, in order to enable the city leaders to push and to give political support to environmental collaboration. Cities in BTH have also established formal and informal platforms to promote inter-city cooperation on environmental affairs. The formal channels including the formulation of Environmental Joint Protection Agreement and the formation of specific joint working plans. Informal channels include the organization of regular or irregular meetings among the main leaders for discussing and negotiating regional economic and environmental issues and solutions. If we look at the first path for weak inter-organizational activity, we may further confirm this point. The missing of any strong horizontal meta-governance or strong leadership must lead to the result of weak inter-organizational activity. This suggests that both self-organizing mediation and facilitation efforts at the organizational level between member cities in UA and informal ways of facilitation and communication between leaders of member cities in UA are necessary ingredients for strong inter-organizational activities.

**Table 5.** A summary of Qualitative Comparative Analysis (QCA) results.

| Outcome | Paths | Cases |
|---|---|---|
| Strong inter-organizational activities | Strong horizontal meta-governance; Strong leadership; Small environmental status disparity, | Pearl River Delta (PRD); Yangtze River Delta (YRD); Beijing-Tianjin-Hebei (BTH). |
| | Strong horizontal meta-governance; Strong leadership; Small autonomous capacity disparity. | Middle Yangtze River (MYR); Yangtze River Delta (YRD). |
| Weak inter-organizational activities | Weak horizontal meta-governance; Weak leadership. | South Central Liaoning (SCL); West Bank of Strait (WBS). |
| | Weak vertical meta-governance; Weak leadership; Large environmental status disparity. | Chengdu-Chongqing (CY); Shandong Peninsula (SP). |
| | Weak vertical meta-governance; Weak horizontal meta-governance; Large autonomous capacity disparity; Large environmental status disparity. | Harbin-Changchun (HC). |

The second path to strong inter-organizational activity, in addition to YRD, also include the agglomeration of MYR. In the MYR case, the Hunan province, the Hubei province and the Jiangxi province did substantial spontaneous cooperation on environmental affairs. The three provinces formulated the Agreement of Strategic Cooperation on Formation of Urban Agglomeration, A Memorandum of Cooperation between Chamber of Commerce in the UA, the Agreement on Inter-Provincial Consultation and Cooperation Mechanism and the Joint Declaration on Lake Protection and Ecological Restoration. Regarding informal communication by leadership, the main leaders in MYR established the Consultation and Negotiation Meeting System for Main Leaders, the Symposium on Ecological Protection and some other meeting systems focusing on cooperation on water transportation and technology.

We also find out some sufficient conditions for strong inter-organizational activity. A condition is sufficient but not necessary if it is capable of producing the outcome but is not the only condition with this capability. In our study, the sufficient conditions are small autonomous capacity disparity and small environmental status disparity. That means, it is easier for horizontal meta-governance and leadership to become effective when the participating cities have small differences in their autonomous capacities and environmental statuses.

When looking at the paths resulting in weak inter-organizational activity, we found that two UAs, SCL and WBS, failed in achieving strong inter-organizational activity because they lacked strong horizontal meta-governance and strong leadership. These phenomena further confirm our findings on the necessary conditions for strong inter-organizational activity. In both UAs, few horizontal efforts were put into building inter-city agreements or joint plans. The only exception is in SCL that Shenyang and Dalian determined to share the important opportunity of opening-up and developing the Liaoning coastal economic belt. As to the leadership dimension, the main leaders in Shenyang and Dalian did not meet each other for cooperation on environmental affairs. In WBS, the main leaders did meet each other, for only a few times through the Mayoral Joint Meeting System, on discussing cooperation on economic affairs, not addressing environmental issues.

There are two UAs, CY and SP, which had strong horizontal meta-governance and still failed in achieving strong inter-organizational activity. The conditions for the failure include weak vertical meta-governance, weak leadership and large disparity in environmental status. In both UAs, although many inter-city agreements and programs were formulated, the political leaders were reluctant to communicate and did not give sufficient support to push the implementation of the joint plans. For example, both CY and SP have Mayoral Meeting Systems; however, the main leaders only discussed on economic affairs, not touching upon cooperation on environmental issues.

The last case is the HC agglomeration, which lacks the most favorable conditions to strong inter-organizational activity. In HC, both vertical meta-governance and horizontal meta-governance were missing. Although the central government enacted the Development Plan for Harbin-Changchun Urban Agglomeration, no follow-ups emerged to mobilize central resources for its implementation. Moreover, although the main leaders in northeastern China frequently met each other, very few concrete inter-city working plans came out, resulting in weak horizontal meta-governance because of the lack of cooperative rules and structures. What made things even worse, in HC, the member cities had large disparities in autonomous capacities and environmental statuses.

Based on these evidences, it is interesting to see that strong vertical meta-governance may not be a necessary ingredient for strong inter-organizational activity. This observation challenges the current viewpoint in literature that since China has a top-down and central planning tradition in decision-making, vertical intervention and meta-governance efforts such as conflict mediation and reconciliation from higher-level authorities are necessary for regional cooperation regarding policy integration [38,51]. This point can be further approved if we look at the paths of strong inter-organizational activity in Figure 2. In both paths, strong vertical meta-governance is absent but the outcome is still strong inter-organizational activity.

## 6. Conclusions

This article aims to examine what conditions, in combination, drive inter-organizational activities in cooperation on environmental governance in the Chinese urban agglomerations. In order to do so, we distinguish "strong" and "weak" intensity of inter-organizational activities as two variations of cooperation outcome. To establish conditions for inter-organizational activity, we did a literature review and distilled five conditions that become enablers or disablers of cooperation. Conducting the QCA proved fruitful for gaining an understanding of what conditions, in combination, drive the intensity of inter-organizational activity.

When looking at strong inter-organizational activity, strong horizontal meta-governance and strong leadership stand out as necessary conditions. Strong horizontal meta-governance epitomizes the formal approach that member cities in a UA take towards cooperating with each other through building up structural elements for the cooperation (e.g., joint goals, coincide values and ground rules and orders), avoid potential conflicts and solidify deep inter-organizational involvement. Strong leadership entails an informal approach that efforts and abilities of the top leaders from member cities in bringing parties to the table and for steering them through the rough patches of the cooperative process. It is also called "assisted negotiation," emphasizing the role of leaders in using the interventionist mediation techniques in situations that stakeholders are unable to directly cooperate.

These findings conform to what Donald Chisholm [52] refers as complementary mechanism of formal and informal coordination in multi-organizational systems. According to Chisholm, at the starting-up stage of cooperation, informal channels are most frequently used methods for coordination; after cooperation has been on track, informal channels for coordination may remain useful when formal channels are introduced alongside them, because they often work more rapidly and efficiently, being able to tap from an existing reservoir of trust and mutual understanding between the cooperating partners. Therefore, these findings suggest the importance of both formal and informal coordination and communication for deep involvement to flourish.

While having these two conditions in place are necessary for more involved inter-organizational activity, they are not sufficient. Cases that display these conditions tend to also have two different additional combination of conditions. They either possess small environmental status disparity or possess small autonomous capacity disparity. Put another way, member cities in UA need not have all the conditions in place to interact in more involved ways; they can either naturally have relatively the same level of environmental status, or they can put energy into their own capacity building in autonomous environmental governance.

At the other end, member cities that engage in weak inter-organizational activities have weak vertical meta-governance, weak horizontal meta-governance and weak leadership. Cities in these agglomerations lack central attention and political support; they tend not to discuss with each other about cooperation on environmental issues and have little formal or informal coordination channels in place. They also are typically unclear about the joint goals and their own roles and responsibilities within the collaboration. They do not make joint plans or strategies; they also do not conduct environmental enforcement activities together; they have not established any joint organizations.

Given these findings, the theoretical added-value of this article is that it does not treat all conditions equally in terms of their impact on the intensity of inter-organizational activity; rather, it identified how the combination of various conditions, not necessarily the whole set of conditions, made a difference on the intensity of inter-organizational activity. However, as with all small n studies, attempting to generalize these findings too broadly can be problematic. In spite of this, the way that we measure the intensity of inter-organizational activity and various conditions in this study are probably highly useful for similar studies focusing on cooperation.

In this article, we formulated five conditions for inter-organizational activity to occur. The paths to strong and weak inter-organizational activity depend on the formulation of conditions. It is possible that different paths might be obtained if other groups of variables are used as conditions. Therefore, further research is required to assess the extent to which the conceptual arguments and the empirical findings presented in this article are reliable and robust.

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