

Explaining the variety in smart eco city development in China-What policy network theory can teach us about overcoming barriers in implementation?

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ABSTRACT

The Pearl River Delta (PRD) is one of the largest and fastest growing urbanized deltas in China and the world. Its municipalities hope to attract investors, firms, high-quality labour force and residents in line with ecological modernization. They do so by using a variety of attractive city labels, such as eco city, low carbon city, and smart city. The physical shape these city labels take is best exemplified in the emergence of large new towns at the fringes of existing urban areas. Few studies to date unearth empirical evidence as to how municipal governments in China implement their smart eco city ambitions. This study does precisely that by examining how concrete policy networks at the local level develop new towns in the Pearl River Delta. The Policy Network Theory is used to map the positions actors have in three different new town projects in Shenzhen, Foshan, and Zhuhai respectively. It explains project progress or lack thereof by studying the organizational constellations that structure the interactions among actors and how the constellations affect their resources exchange. Our analysis suggests that in the various arenas where policy actors meet each other and are supposed to exchange resources and work out viable policy packages, blockades exist preventing such exchanges from happening. This creates impasses to which different cities have found different institutional and organizational answers.

Keywords: New town development, Smart city, Eco city, Sustainable city, Policy network theory, Policy instruments

1. INTRODUCTION

135 The Pearl River Delta (PRD) is one of the largest and fastest growing urbanized deltas in the world. Strong economic growth has unfortunately been accompanied by severe soil, air and water pollution, causing widespread environmental and health problems (Greenpeace, 2010; Oizumi, 2011; Ouyang et al., 2006). The nine responsible municipal governments have prioritized sustainable urbanization and industrial restructuring in their respective policy documents (Lu et al., 2017). Their policy adage is to sustain economic growth and preserve environmental quality through ecological modernization. The policies suggest that a cleaner and more knowledge-intensive industrial structure will result in a service economy with higher value added and less physically harmful emissions (Bayulken and Huisingh, 2015; Mol and Spaargaren, 2000). Shenzhen proposes to become “a modern international innovative city” in Shenzhen 13th Five Year Plan (SZ Municipality, 2016). Foshan focuses on becoming “an advanced manufacturing base” and “a service center for industries” in the Foshan Urban Plan (2012–2020) (FS Municipality, 2012). Zhuhai states that the various tiers of government have an obligation to develop urban projects that meet the sustainability targets listed in their policy plans and communicated to the public: it is to evolve into “a Beautiful Model City in China” in the Zhuhai Urban Master Plan (2001–2020) (ZH Municipality, 2001).

Fleshing out these ambitions requires a diversity of responses on multiple levels, at multiple scales, and among many actors (Dushenko et al., 2012; Hooghe and Marks, 2003). However, although all levels of government have a shared responsibility in ecological modernization, the physical implementation of these initiatives can eventually only be observed at the local level (Frantzeskaki and Loorbach, 2010; Kes et al., 2013). Since 1949, China has established a unitary governance system. The power is **136** allocated to various levels of governments, including provincial, prefectural, county, township, and village level (Ma, 2005). To reach the environmental targets through eco city and low carbon city projects, the prefectural level administrative units, such as municipal governments, play a key role in these programs. With the ambition to become eco and sustainable, cities adopted various programs, pursuing sustainable initiatives in eco city, low carbon city and smart city concepts (Anthopoulos, 2017; de Jong et al., 2016; Fu and Zhang, 2017a), while still maintaining the economic growth levels. On the one hand, local governments are supposed to meet the sustainability requirements imposed on them by higher levels of government in China (Lu et al., 2017). On the other hand, since national and provincial policies leave many detailed aspects of sustainable urban development unmentioned, only local governments can fill in these specifics when considering their local context (Rydin, 1997). Municipalities hope to create a name and reputation which allows them to attract those investors, firms, human resources, residents, and visitors. The ecological modernization policies fit their goal while

also securing support from higher tiers of government at the same time (Caprotti, 2014; De Jong et al., 2015; Joss, 2011; Joss and Molella, 2013). In one report about ecologically carbon city development in China in 2016, nearly 90% of municipalities in China promoted “eco city” and “low carbon city” in their development targets (Fang et al., 2016).

In the Pearl River Delta, as in many other parts of China, the physical shape these city labels take is best exemplified in the emergence of large new towns at the fringes of existing urban areas (Hsing, 2010). It has been observed that the implementation of the social and environmental ambitions underlying these new town projects faces a host of challenges. The notable ones include the interaction between central and local governments, the governing capacity of less prosperous cities and the overblown expectations of adopting technological solutions from other countries (de Jong et al., 2016; Hult, 2013). More generally, many studies also acknowledge the difficulty of integrating issues of sustainability into governance patterns, such as organizational structures and daily operations and routines (Conroy, 2006; Conroy and Berke, 2004; Jordan, 2008). Although some scholars attempt to study the governance of these smart eco projects under the shadow of hierarchy (de Jong et al., 2016; Khanna et al., 2014; Miao and Lang, 2014), few studies to date unearth the policy-making process in eco city and smart city development. It is also unclear to the extent to which actors depend on each other and how the impasses caused by practicalities in the local governance context are resolved.

In this contribution, we examine the specific actors operating within the policy networks involved in three new town projects in the Pearl River Delta, since findings from China are useful due to the size of the under-development eco city and smart city projects. We sketch the organizational constellation in which they operate, their goals, resources and interdependencies and how these evolve. We explain their (sometimes lack of) progress using impasses and breakthroughs resulting from these interactions and interdependencies. We ask ourselves *what is done with the implementation of the ambition underlying the city labels in new town projects on the ground. What are the barriers to realizing the smart eco city ambitions at the local level as seen through the lens of interdependencies among actors in a policy network?*

There is continued academic interest in studying urban governance in China. After 1994, local governments gradually have gained more financial and administrative power through taxation reform (Yang and Wang, 2008; Zhu, 1999). The pursuit for economic growth at different levels of governance and rising competition among municipalities are studied through concepts such as local state corporatism (Hsu and Hasmath, 2014; Oi, 1995, 1992), the entrepreneurial city (Jessop and Sum, 2000; Wu, 2003) and urban growth machines (Wu, 2015; Zhang, 2014). However, these theories only weakly explain the dynamic positions of actors and organizations in the urban development and focus too much on governments and

real estate developers. Complex formal and informal relationships among actors in decision-making processes also triggered scholarly interests. Alongside this trend, policy network theory has been adopted to study urban policy in China, and it has also been used in urban projects more recently.

Here, we lean on their mapping of groups of actors as the first research step but take specific local contexts into account where it appears that specific network settings in which these groups of actors interact are of vital importance to a proper understanding of policy processes and policy outcomes. To the best of our knowledge, this study is certainly not the first attempt to apply policy network theory to understanding decision-making processes in China, but it is the first one to make sense of the impasses and breakthroughs in new town projects.

In what follows, Section 2 first reviews the key concepts in policy network theory and formulates an answer to its applicability in the Chinese context. In Section 3, we briefly present our research methodology. Section 4 will introduce the impressive phenomenon of new town development in China and which groups of actors play which key roles in it. In Section 5, one can read the stories of three different new town projects in three different cities in the Pearl River Delta (PRD) and examine the interdependency among local actors and how this explains project progress so far. In Section 6, a comparative analysis is made of the three cases which allows us to spot the actor dependency map, which illustrates the roles and interdependency of actors in each policy network in three projects and how these affect the impasses and breakthroughs of new town projects. Finally, Section 7 concludes.

2. POLICY NETWORK THEORY AND ITS APPLICATION TO CHINA

Policy Network Theory (PNT) is a cluster of concepts focussing on the formal and informal institutional linkages among various interdependent governmental and other actors sharing a common interest in policy-making (Rhodes, 2006). Policy network analysis began as a metaphor and became a theory by developing along the lines of sociological network analysis (Dowding, 1995). PNT explains why policy concepts often fail to be realized on the ground, or to put it more mildly, why good policy intentions are often diluted or twisted during implementation (Hudson et al., 2007; Klijn and Koppenjan, 2000). PNT has been adopted by a great many scholars in Europe and North America to analyse urban development (Bache, 2000; Deas and Ward, 2000; McGuirk, 2000). More recently, the adoption of PNT in urban studies can also be traced in Asian countries, including China and South Korea (Woo, 2013; X. Zhu, 2013a; Y. Zhu, 2013b). Below (1) some essential concepts in PNT are introduced after which (2) its applicability to the Chinese context is examined.

First, policy actors are assumed to have objectives they aim to see realized as if in a game-like network setting and this includes a perception of the problem

situation at hand (Van Bueren et al., 2003). These perceptions have evolved based on earlier learning experiences. Both the objectives and strategies are derived from their perceptions. Objectives are concrete (partial) translations of perceptions (de Bruijn and ten Heuvelhof, 1991; Koppenjan and Klijn, 2004).

Additionally, actors require resources or policy instruments to reach their objectives, and some of these resources are owned or controlled by other actors thus creating interdependency (Borzel, 1998; Klijn and Koppenjan, 2000; Marsh and Smith, 2000). These resources include a range of political, legal, financial, organizational, physical and informational instruments or tools that jointly ¹³⁷ flesh out policy concepts into concrete and visible actions (de Bruijn and ten Heuvelhof, 1991). Hood and Margetts (2007) propose to use Nodality (information or knowledge), Authority (legal approval), Treasure (funds) and Organization (staff and other physical resources to implement) as a typology of government tools. This framework is regarded as the most suitable one in network governance (Vabo and Røiseland, 2012).

By swapping objectives and resources, involved actors develop interactions through which they aim at impacting the behaviour of other actors thus hoping to solve their own problems as well as those of society at large. To map actor interdependency, we use 'arenas' to distinguish between various series of interactions. Arenas are places where specific groups of actors interact on an issue and make choices on specific aspects of the issue (Van Bueren et al., 2003). Concrete interactions take place in one or more arenas, and some actors can be involved in more than one arena (Zheng et al., 2010). The actors' resources and their strategic behaviours determine their positions in the arenas (Klijn and Koppenjan, 2000; van Bortel, 2009). In arenas relevant to new town development, these actors have different roles (approver, decision-maker, executor, financier, or resource provider). To reach agreement in each of these arenas, exchanges need to be made between certain actors (See Fig. 1). These interactions are not completely free, but at least partly guided by formal and informal institutions or 'rules of the game' (Koppenjan and Klijn, 2004).

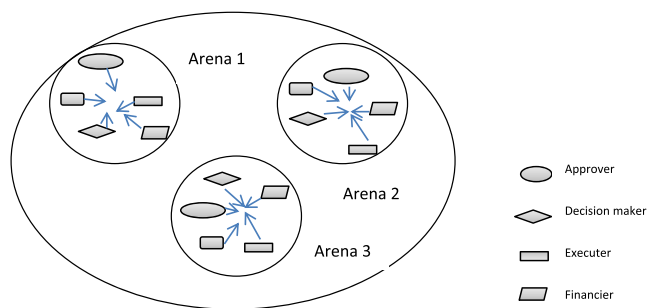


Fig. 1. The actors and their interactions according to policy network theory.

While developing strategies and tactics to reach their objectives and fulfil their interests, actors undertake initiatives to build packages of policy measures in collaboration with other actors and see them supported or blocked (Teisman, 2000). Alternatively, they may support or block such initiatives and packages as developed by other actors. While mutual blockages may end, hamper or delay progress and create impasses, mutual support may generate breakthroughs and accelerate changes.

The context of the urban development in China also provides an excellent opportunity to adopt PNT in research. Economic reforms have encouraged private actor participation in the housing and infrastructure development in China. Since 1978, private and foreign investment have continued to flow into the real estate market and played a vital role in urban development (Wu, 2001). Since the amount of governmental expenditure on public facilities is limited, the involvement of private capital is encouraged (Bellier, 2003; Zhan et al., 2017). Although the public sector is still the most influential stakeholder, private sector participates more actively in the housing and infrastructure development. This growing interwovenness between the public and private sectors alongside the already pre-existing connections among various public actors suggests that PNT is as applicable to urban (and new town) development in China as it is elsewhere (Zhang, 2002).

One way to understand the application of PNT in China is through the distinction between the Anglo-Saxon school (Dowding, 1995; Marsh and Smith, 2000; Rhodes, 1990) and the German-Dutch school (Borzel, 1998; Klijn, 1996). The Anglo-Saxon school has embraced more of a stronger micro and mesoperspective, emphasizing the interactions among organizations, even individual actors. The German-Dutch school focuses on the meso-level and macro-level and analyses the national, provincial, municipal policy areas and corresponding policy actors (Zheng et al., 2010). In China, most scholars are inspired by the German-Dutch school to study urban policy in China (Pow and Neo, 2014; X. Zhu, 2013a; Y. Zhu, 2013b). On the macro-level, some of these scholars explained the national policy failures through the interactions among different governmental tiers under specific institutional contexts. Y. Zhu (2013b) studied the paradigm shifts in the housing policies and stated that the relative closure of the policy network delimits policy instruments actors choose from and hinders paradigm shifts. Additionally, de Jong et al. (2016) adopted PNT as an analytical framework to investigate the implementation of national eco city policy programs, and the implementation gaps were explained by indicating how national government underestimated its dependence on collaboration with local governments and developers. Nevertheless, there are limitations in these macrolevel studies, because they are based on general observations on the national level and making less reference to specific local settings.

Other scholars are also interested in applying PNT on the mesolevel to understand urban policy development in China. To study the role of local knowledge in project development, Sun (2015) adopted the concept network governance to

describe the inputs from different stakeholders in the governance instead of hierarchy steering. Dai (2015) adopted policy networks and saw them as stable contextual settings to analyse new town projects around high-speed railway stations. In her research, different modalities of actor relations are identified to understand the conflicts and controversies in the policy process. At the meso-level, most of these scholars find that PNT can benefit Chinese governance since private actors have become important in the market economy, and residents and various organizations also participate in the urbanization process. These studies shed light on understanding the policy process of urban project development in China. Nonetheless, most of the discussions remain at the level asking how the government can optimize the resources by involving more stakeholders and selecting the suitable policy instruments generated by various policy actors. Less attention has been paid to the impacts from the interactions among actors in policy implementation, mainly based on their resources and interdependency.

Although PNT has gained popularity in China and its application there is considered appropriate, in a few respects, it acquires a specific shape. Not only governments have the resources needed for urban development; but so do some other actors. The large state-owned enterprises (SOEs) in China are conspicuous playing the role of investors, project developers and infrastructure providers. The relationship between governments and state-owned enterprises can hamper the resources allocation and exchange among other actors. Therefore, ownership and exchange of resources serve as critical factors in streamlining policy processes. It is worthwhile to take one step further by explaining policy breakthroughs and impasses by the resource exchange among actors.

3. RESEARCH METHODOLOGY

Our empirical study will not deploy the entire arsenal of PNT related concepts, but only that subset allows us to sketch the comparative statics of actor network constellations. This implies that we will map the policy actors involved in the policy process of 138 new town projects, examine their objectives and resources and their interdependencies. We will also explore what these constellations and interdependencies looked like at different moments in time and whether this led to impasses and breakthroughs. However, we will not analyse the dynamics of decision-making in the sense that we map the interaction processes over time or analyse changes in the actor perceptions. Not only is this far harder to establish, but also answering the research question underlying this contribution does not require us to use this more elusive part of the conceptual and methodological complex around PNT.

Our empirical work was conducted as follows. First, we took a general glance at new town development and the role of urban greening in China as a whole and then in the Pearl River Delta more specifically. We did this with an actor-centred

orientation in line with PNT. The results of this step are reflected in Section 4. Then we selected from among a broader population of new town projects listed in provincial and municipal plans described as tending towards ecological modernization. The selection criteria are twofold. First, the cases should be supported by the national or provincial governments to be an exemplar for eco, low carbon or smart city development, which ensures the projects include not only property developments per se, but also adopt ecological considerations. Second, considering the investment capacity of cities, we initially selected two locations in the prosperous cities Guangzhou and Shenzhen, and two in the less developed cities Foshan and Zhuhai. These cases allowed us not so much to draw a representative sample of the population as a broad variety of new town projects having various network settings where actors perform different roles, and different interdependencies can be identified. Unfortunately, it proved impossible to find enough cooperative respondents for the case in Guangzhou (Sino-Singapore Knowledge City). We have been there twice to organize our fieldwork in 2015 and 2016, but motivated we were to include this case, we eventually had to abandon it.

As for the other cases (Shenzhen, Foshan and Zhuhai), our goal has been to

1. describe the origin, official goals and status quo of the project
2. inventory the various involved actors, their objectives, and resources
3. map their interdependencies based on the resources they owned and their roles in arenas
4. find out in which arenas decision-making has already been completed and which one(s) still prevent further progress because required exchanges of resources have not occurred
5. examine how actor constellations and interdependencies affected the passing through the arenas and what effect this had on the implementation of the ambitions regarding ecological modernization

We made field visits to each location and conducted some interviews in each of the three cities with representatives of involved actors in the period April 2015, June 2016 and July 2017. In total, 16 persons have been interviewed during the study, six of whom have been interviewed more than once (See Appendix). To complement these interviews, we primarily relied on official websites and relevant project publications to understand the urban context as well as the involved actors and their objectives, resources and relative positions. As it later appeared that sometimes additional empirical data were required to follow the format of the five steps mentioned above and to verify if there were any updates in the projects, we conducted additional telephone interviews and email inquiries with officials and experts. In Section 5, summary descriptions of each of the cases are given after which Section 6 presents a comparative analysis of the cases.

4. NEW TOWN PROJECTS IN THE PEARL RIVER DELTA

4.1 New town projects in general

Generally, new towns are defined as towns or small cities located near large cities (Tan, 2010). There are diverse types of new towns. In general, referring to Firman (2004), there are two types of new towns. The first type is new towns built in the periphery of cities. The second type is the urban project within the built-up area within the city through urban renewal or regeneration. The cases studied in this research belong to the former type. In China, environmental pressures have urged local governments to incorporate technological and ecological features in these projects (Fu and Zhang, 2017b). Some new towns were even selected as pilot or demonstration projects for sustainable development or industrial upgrading in cities, such as “eco city”, “low carbon city”, “smart city”.

While “eco city” was initially focused on improving environmental quality in general, growing concern about greenhouse gas emissions has led to a rise of “low carbon cities” and “low carbon eco cities”. Green buildings and technologies were introduced reflecting the new mission of carbon reduction. Against a background of Information and Communication Technology (ICT) development, cities in China more recently have begun to explore solving urban problems through information technologies. ICT facilities have been provided across the territory of cities to flesh out “smart city” projects which embed traffic systems, power grids and even anti-crime policies within the realm of e-governance.

The development of eco-smart new towns in China is an interesting combination of three inputs: national politics, local politics and global policy mobility (Wu, 2012). At the national level, the “eco city”, the “low carbon city” and even the “smart city” are advocated by different ministries in China (de Jong et al., 2016; Liu et al., 2014). At the local level, the local government uses the opportunities created by these new initiatives to promote urban quality and liveability and competitiveness. As “international best practices”, they are quickly adopted as ways to become benchmark cities in the global arena. Global policy mobility, which introduces various eco-city imagineering and environmental technologies from overseas, also brings knowledge and financial input from overseas (Miao and Lang, 2014; Chang and Sheppard, 2013a,b).

As one of the largest megacity regions in the world, the Pearl River Delta (PRD) occupies 56,000 km². It consists of nine cities and had around 80.69 million residents in 2016 (nearly 5% of China’s total population). As a key manufacturing base of the world, the GDP growth rate of the PRD has been over 11% over the last twenty years. This region contributes about a tenth of the nation’s output.

The urban expansion in Chinese cities is written in their urban master plans, which guides the corresponding spatial change for the next decade. After searching

the term “new town” (*Xincheng*) in the municipal master plans from nine cities in the PRD, a new town inventory is established by selecting the ones stated as targeted development areas for these cities in the near future. The introductory information for the new town inventory is presented in Fig. 2. Among ten new towns in the PRD, Guangzhou and Shenzhen have more new towns planned than the rest of the cities, and more than half of their new towns receive support from the national government as demonstration areas. As for the prefecture-level cities, numbers of new towns launched per city vary from 0 to 3, with most having just 1. Of those, only two in Zhuhai, one in Foshan, and one in Zhongshan receive some form of national support.

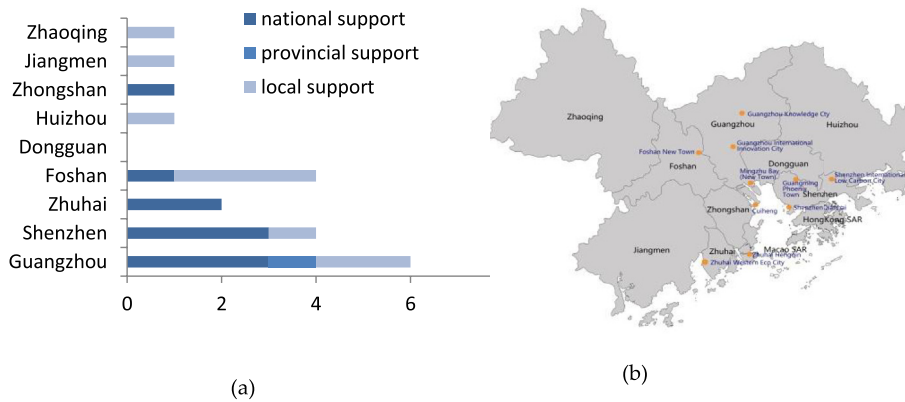


Fig. 2. (a) The Number of New towns in each city in the PRD (b) the Locations of national support ones (Lu et al., 2017).

4.2. Main actors and their resources

The actors involved in the implementation of new town projects ¹³⁹ in the Pearl River Delta are the different levels of government (national, provincial and district), developers and financiers (cloaked either as public or private enterprises), architects and consultancy firms. In some cases, non-governmental actors and foreign governments also participate the project. The general objectives, resources and interdependencies are summarized below, albeit that in the three cases in Section 5 we find that the specific objectives, resources and interdependencies that exist in each case make a vital difference to the project processes and outcomes.

Some new town projects are led by ministries at the national or provincial level through eco, low carbon or smart city development programs. However, these higher level governments are often not directly involved. The projects are funded by municipal and/or district governments and/or developers. Ordinarily municipal governments play the leading role in projects and coordinate with district governments at the early stages (Yin et al., 2016). Although spatial visions come

from higher governments, the complexity and uncertainty of the local context for these urban projects requires organizational capacity from district governments. The land is a crucial resource for villagers in new town development. One of the challenges of smart eco new towns is land preparation where local governments need to negotiate with villagers and hammer out the conditions to achieve mutual agreements. Apart from those resources, the development of urban projects also requires financial investment and technical knowledge, which demands the presence of developers. State-owned developers still contribute hugely to China's real estate market, while the private ones also exist. In new town projects, three types of developers can be found. The first type consists of companies founded to take on construction and management, called new town finance and development companies. They facilitate the local government, possibly acquire highly valuable land and they aim to boost their knowledge of running sustainable development projects. The second type of state-owned enterprises evolved from former central or provincial administration units. Last but not least, private developers range from small and medium-sized to large, including both domestic and international companies.

4.3. Actor interdependency in different arenas

In most new towns in the PRD, the life cycle is twenty or thirty years, and the construction often started with initial zones, and then expansion zones. The initial zone is the test and preparation step for a new town. Since most cases in the PRD have only reached the initial zone development stage, this paper specifically focuses on the interactions among the main actors in three arenas in the initial zone (1) agenda setting, (2) land preparation and (3) infrastructure provision.

Resources or policy instruments controlled by actors can be analyzed based on the NATO framework (Hood and Margetts, 2007): Nodality (information or knowledge), Authority (legal approval), Treasure (funds) and Organization (staff and other physical resources to implement). Here we connect the resources owned by actors with their positions within the arenas. The actors with Nodality are the organizations with information and knowledge and are called advisors, the actors with Authority have legal power and are approvers, the actors with Treasure contribute funds and are financiers, and the actors with Organizational resources have the people doing the actual organizational and physical work and are called executors.

In the agenda setting arena, national and provincial governments participate in new town projects as approvers, and the municipalities are the primary decision makers, who establish administrative bureaus to lead and manage the development of new towns. In this process, advice from urban planners facilitates the government in their decision-making and drafting of the master plan. In the land preparation arena, land use is quite strict in China, which requires permits from the municipal, provincial and national governments. With the approval from higher

governments, district governments are the executor communicating with villagers, which also involves the participation of developers in some cases. Villagers are informed and consulted on the changes in land use relevant to them and their consent is crucially important. In the infrastructure provision arena, developers provide the funding for these infrastructures providers, and they expect an increase in land revenues at a later stage of new town development.

5. THREE CITIES, THREE NEW TOWN PROJECTS

As discussed in the section on research methodology, based on an inventory of new towns in the Pearl River Delta, we selected three projects with national support, one from an Economic Special Zone city, Shenzhen, and two from prefecture-level cities, Foshan and Zhuhai. They can be seen as examples towards ecological modernization: International Low Carbon City (ILCC) in Shenzhen, Foshan New Town in Foshan and Western Eco Central City in Zhuhai (See Table 1). These three show a sufficient variety in organizational patterns to verify how different actor constellations affect implementation progress differentially.

Table 1. Introductory Information about the three New Town Projects (Shenzhen, Foshan and Zhuhai).

	New town project	Total size	Initial zone size	Starting point	Supporting program
Shenzhen	International Low Carbon City (Shenzhen)	90 km ²	1 km ²	2012	National Low Carbon City Pilot (National Development and Reform Committee)
Foshan	Foshan New Town	88.60 km ²	5 km ²	2003	China-EU cooperation urbanization demonstration Pilot (MOHURD and EU)
Zhuhai	Zhuhai New Town	200 km ²	10 km ²	2009	China-EU cooperation urbanization demonstration Pilot (MOHURD and EU)

5.1. Case 1 Shenzhen

5.1.1 General project introduction

Shenzhen positions itself as “a modern international innovative ¹⁴⁰ city” in its 13th FYP (SZ Municipality, 2016). It is the leader among the innovation cities in China as well as in low carbon development, and it aimed to be the “National Low-Carbon Eco Model city” in its 12th FYP (SZ Municipality, 2011). This low carbon development strategy is shown in one of its new town projects, Shenzhen International Low Carbon City (ILCC). The latter is located in Pingdi, part of Shenzhen’s Longgang district, and supported by the National Development and Reform Committee as a flagship project for national low carbon development in China.

5.1.2 *Actors and their resources*

ILCC officially kicked off in 2012 with the Shenzhen municipal government as the driver. The principal actors are listed below.

- The national government has approved ILCC to explore low carbon development and as the Pilot EU Sustainable Urbanization project in 2012.
- The Guangdong provincial government supported ILCC to explore a possible model for low carbon development and industrial upgrading in China.
- The Shenzhen municipal government initiated this project to foster economic restructuring of this area in Shenzhen.
- The municipal ILCC Office, operating under the Shenzhen municipal government, is the executive organization of ILCC project.
- The Longgang district government represents the district in which ILCC is situated. It has the knowledge and experience of local conditions.
- The Shenzhen Construction and Development Group (CDG), a State-Owned Enterprise (SOE) and an executive and financing organ of Shenzhen municipal government, is responsible for providing a considerable part of the finance used for ILCC's development.
- Overseas Chinese Town Holdings Company (OCT Group), an SOE developer, with experience in cultural and tourism industrial management, is contracted to provide infrastructure in the 5 km² extension zone in ILCC.

5.1.3 *Impasses and breakthroughs in arenas*

The idea for the ILCC originated from a proposal made by a team of Chinese and Dutch experts in 2011 for an ECO-2-ZONE. However, although the Shenzhen municipal government preferred the government to government cooperation as in Sino-Singapore Guangzhou Knowledge City, the Dutch side was not interested in contributing financially. With inputs from both Dutch and Chinese experts, the master plan was approved in July 2012. The Shenzhen municipal government changed its name to International Low Carbon City to attract more partners from a variety of countries. From then on, annual ILCC forums were organized to attract international attention. The municipal ILCC Office, operating under the Shenzhen municipal government, is the executing organization of the ILCC project. This office was composed of members representing different departments within the Shenzhen municipal government and other key players within ILCC, with the Vice Mayor acting as the office leader. In 2017, ILCC office was placed under the PRD Important Project Office (see in Fig. 3).

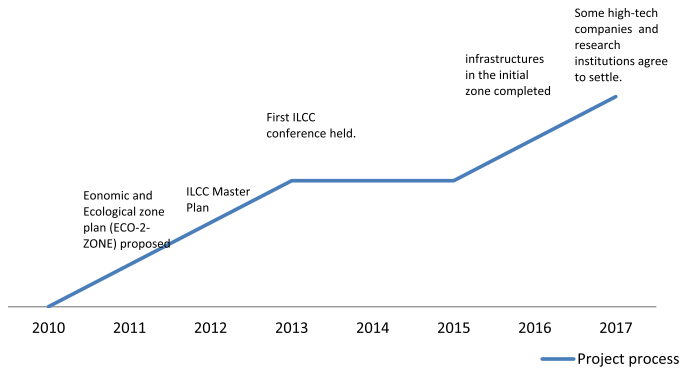


Fig. 3. Project progress in Shenzhen's ILCC project 2010 to 2017.

In the arenas of land preparation and infrastructure provision, CDG was responsible for compensating villagers, while the Longgang district government would return the funding later. CDG was also the financier of infrastructure provision in the initial zone (interviewee 2). The Shenzhen municipal government promised to refund CDG by land or other projects or resources but has not done so yet (interviewee 1). As a financial platform, CDG was non-profit oriented, and its risks were borne by the Shenzhen municipal government. From 2012 to 2016, most of the infrastructure in the initial zone had been completed. In 2017, the Longgang district government began its cooperation with the OCT group, and the 5 km² extension zone entered the planning phase (Interviewee 7).

Until now, the initial zone has been filled with a conference center and a small number of high-tech institutes. Currently, a few promising projects are in the process, including some high-tech companies and research institutions, but most of the available land for construction is waiting for bidding or auctioning (interviewee 4). It still has not shown significant potential in low carbon development yet, and the enterprises attracted are not as high profile as hoped. Based on the interviews in ILCC, the impasses and breakthroughs of ILCC are concluded in the following arenas, agenda setting, land preparation and infrastructure provision (See Table 2). The impasse in agenda setting was the limited involvement of the Longgang district government, and the breakthrough was the restructuring of the ILCC Office. In the land preparation, the villagers were reluctant to give up their land because they were dissatisfied with the offered compensation. A new way to compensate the villagers adopted in 2016 was the breakthrough. The Shenzhen municipal government encouraged the villagers to transfer their land for a better economic benefit based on 30% reserved land (Zhan and de Jong, 2018). In the infrastructure provision, although CDG acted as a financier in the initial zone of ILCC, the impasse lied in the wavering attitude from governments in their cooperation with CDG, because a private developer with more resources and experience was

preferred by the Shenzhen municipal government. The breakthrough was an independent state-owned developer, OCT, cooperating with the district government for the 5 km² extension area.

Table 2. Impasses and breakthroughs in agenda setting, land preparation and infrastructure provision in Shenzhen's ILCC.

Shenzhen arenas	Impasses	Sources	Breakthroughs	Sources
Agenda setting	Less involvement of the Longgang district government	Interviewees 2 and 5	Restructuring the ILCC Office	Interviewees 3 and 7
Land preparation	Dissatisfaction with government compensation	Interviewees 1 and 5	New way to compensate the villagers	Interviewee 3
Infrastructure provision	Wavering cooperation with the developer	Interviewees 2 and 7	Independent state-owned developer cooperates with Longgang district government	Interviewees 3 and 4

5.2. Case 2 Foshan

5.2.1 General project introduction

141 Foshan city is one of the traditional manufacturing centres on the western bank of the PRD. Foshan positioned itself as “an advanced manufacturing base” and “a service center for industries” in the Foshan Urban Plan (2012–2020) (FS Municipality, 2012). The former expressed its hope to encourage advanced manufacturing, and the latter its desire to grasp the advantage of being adjacent to Guangzhou to provide service outsourcing for both production and consumption in this region. These city profiles are also reflected in the development targets of its new town projects, such as “Guangdong Industrial Service Model Zone” and “National Cultural and Innovation Industrial base”.

5.2.2 Actors and their resources

The governments played the leading role in Foshan New Town development. The Foshan municipal government initiated it, and later the leadership was transferred to the Lecong town government and the Shunde district government.

- The national government supported Foshan to be a pilot in China-EU cooperation in urbanization demonstration (MOHURD and EU), and Foshan New Town was part of the pilot package in 2014.
- The Guangdong provincial government considered Foshan New Town one of its key development projects for industrial upgrading and economic restructuring.
- The Foshan municipal government initiated building this area and planned it to become a new town in 2007.

- The Lecong town government represents the township in the area where Foshan New Town is located.
- The Shunde district government is an independent city district under the supervision of the Guangdong provincial government.
- The New Town Management Committee is the management organization of Foshan New Town.
- The developer in Foshan New town is Foshan New Town Company.

5.2.3 Impasses and breakthroughs in arenas

Beginning from an area providing Foshan with some sports gyms and public facilities for the Provincial games in 2003, it became a new district in Foshan in 2007. Currently, most of the infrastructures in the initial zone are completed, and a few institutes are also built, such as a commercial complex named Sino-European Center (see Fig. 4).

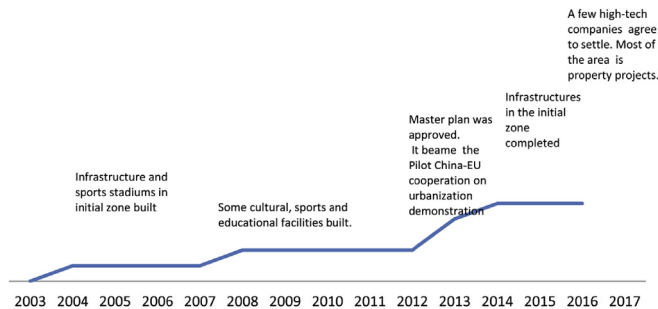


Fig. 4. Project progress in Foshan New town from 2003 to 2017.

In 2007, Foshan municipal government planned this area to be a new town and framed it to be a city center, commercial center, headquarter economic zone, as well as a green city center. Until 2011, some cultural, sport and educational facilities had been built. From 2011 to 2013, the Foshan municipal government transferred the steering role to the Lecong town government, and its position was also updated as a Sino-German service zone, Sino-Europe cooperation zone and modern city with (Southern) Lingnan culture. However, these visions had not been realized because of Lecong town government's limited financial capacities (Interviewee 9). After 2013, the leadership of the new town was handed over to the Shunde district government. It is a city district that can submit its tax directly to the provincial government instead of the Foshan municipal government, which is an unusual arrangement allowing it to have more discretion compared with other districts in Foshan. However, the district government was reluctant to invest in this new town to avoid the competition with its own new town projects (Interviewee 10).

In the arenas of land preparation and infrastructure provision, Foshan New Town Company was the organization responsible for both tasks. As a financial

platform, it received loans from banks to pay for the compensation of villagers and infrastructure investment (Interviewee 8). With the frequent change of leadership in this new town project, the ownership of this company was also transferred from municipal government to town, and then to district government. Recently, its role has been to maintain the infrastructures and promote business in Foshan New Town (Interviewee 9). As for the relocation of residents and enterprises, most of the projects in the initial zone are more about property development rather than industrial transformation.

The interviewees pointed to some impasses in Foshan New Town, for which breakthroughs were not apparent yet (see Table 3). As for agenda setting, the impasses include limited high-level support and international input, and the frequent change of governments in charge. The impasse in land preparation is similar to the one in Shenzhen's ILCC, but unlike in ILCC because there are no breakthroughs yet. In the infrastructure provision arena, the developer was only a financial tool, and its technical and managerial qualifications and resources were limited.

Table 3. Impasses and breakthroughs in the agenda setting, land preparation and infrastructure provision in Foshan New Town.

Foshan arenas	Impasses	Source	Breakthroughs
Agenda setting	Little high-level support and international input; Frequent change in project leadership	Interviewees 9 and 11	None
Land preparation	Dissatisfaction with government compensation	Interviewees 9 and 8	None
Infrastructure provision	Developer is financial tool with limited influence	Interviewee 10 and 11	None

5.3. Case 3 Zhuhai

5.3.1 General project introduction

Zhuhai borders the Macau Special Administrative Region and became one of the Special Economic Zones in the 1980s. Zhuhai is a tourist city and enjoys the advantages of neighbouring Macao, the historical and gaming treasures of which are well-known. It has ¹⁴² protected its environment rather than fast economic growth from manufacturing since 1980 (interviewee 12). Its new town projects show a strong drive to ecological modernization. Zhuhai Western Central Eco City aimed to be an ecological demonstration liveable new town in the PRD, as well as a waterfront garden with characteristics of overseas Chinese culture.

5.3.2 Actors and their resources

The Zhuhai municipal government initiated Zhuhai Western Central Eco City and invited the private developer China Railway to invest in this project.

- The national government supported Zhuhai to be a pilot in China-EU cooperation in sustainable urbanization demonstration (MOHURD and EU), and its Western Central Eco city was part of the pilot package in 2014.
- The Guangdong provincial government considered Western Central Eco city the initial zone of the province-supported New District strategy in 2014.
- The Zhuhai municipal government fostered economic restructuring and hoped the western part of the city would become more competitive.
- The Jinwan and Doumen district governments represent the districts where this new town is located in.
- The Western City Development Bureau is the executing organization under the Zhuhai municipal government.
- The China Railways Group is a state-owned developer in this project responsible for funding the infrastructures.

5.3.3 Impasses and breakthroughs in arenas

Zhuhai Western Central Eco City is a 200 km² project, with a 10 km² initial zone. It was granted the status of provincial eco city by the Guangdong provincial government. The principle of 'sponge city' (similar to resilient city) was also applied to the road construction in this project, and it was the model area for the Zhuhai municipal government to become a national level sponge city in 2016 (interview 13).

From 2010 to 2013, Zhuhai Western Central Eco City had been in the process of agenda setting. After the China Railway Group entered the scene in 2013, its infrastructures have been under construction, including roads, water channels and so on. In the first steps of its development, the China Railways was responsible for financing and construction, and they were paid by 30% of the land revenues. Land preparation and infrastructure construction in this project have seen plodding progress in the past few years (Interviewee 14). The attraction of businesses had not even begun (see Fig. 5).

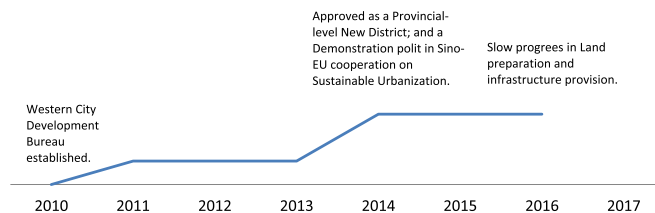


Fig. 5. Project progress in Zhuhai Western Central Eco City from 2010 to 2017.

According to the interviewees, several impasses and one breakthrough can be found in Zhuhai Western Central Eco City (see Table 4). As for agenda setting, the impasses include both limited high-level support and International input, paired with low motivations among the district governments. The breakthrough in agenda setting

is the restructuring of the Western City Development Bureau and the contract signed between the district governments and China Railway Group (Interviewee 15). In Zhuhai, the impasse in land preparation is the same as in the previous two cases. In the infrastructure provision arena, the impasse is an unclear division of responsibilities and rights between the local governments and the developer.

Table 4. Impasses and breakthroughs in agenda setting, land preparation and infrastructure in Zhuhai Project.

Zhuhai arenas	Impasses	Sources	Breakthroughs	Sources
Agenda setting	Limited high-level support and International input; Low motivation of district governments	Interviewee 14	Restructuring of Western City Development Bureau	Interviewee 15
Land preparation	Dissatisfaction with government compensation	Interviewee 16	None	Interviewee 15
Infrastructure provision	Unclear division of responsibility and rights between local government and developer	Interviewee 14	None	Interviewee 15

6. DISCUSSION BASED ON ACTOR INTERDEPENDENCIES

Based on the site visits and interviews in last three years, we map the actor interdependencies in the three cases to understand their breakthroughs and impasses. The impasses can be explained by the failure to realize resource exchanges among actors in these arenas. The decision process in each arena can only be completed if required exchanges have taken place, which leads to breakthroughs. In the following sections, the causes of impasses and breakthroughs in the agenda setting, land preparation and infrastructure provision are explained by the actor interdependency in each new town project.

6.1. Actor interdependencies in the agenda setting arena

In the agenda setting arena, the main actors are approvers (the national and provincial governments), decision-makers (the municipalities) and executors (established organizations to manage the new town). The actor interdependency in the agenda setting arena of Shenzhen ILCC has changed during this process (See Fig. 6). As often observed in China, the national and Guangdong provincial governments are approvers of this project, and municipal government is the decision maker. Their attitudes have a high impact on the development of new towns, including the infrastructure, public services, and resettlement and so on. After the Government-to-Government (G2G) collaboration between China and the Netherlands failed, the management organization of the ILCC project is called the municipal ILCC Office,

which is under the Municipal Development and Reform Bureau. Although it knew more about industrial development, which was the primary task of the Reform and Development Bureau, it did not have a land use permit and real urban planning power, which has remained with the municipal and district governments (interviewee 5). It was difficult to make decisions for the development of ILCC because of its position in such an administrative arrangement. In the past years, project progress had occurred through a 'Conference Memo', signed by the Vice Mayor periodically (Interviewee 2), which increased dependency on the attitude of political leaders. During this period, the urban planning service is provided by Urban 143 Planning Design Institute of Shenzhen, which is owned by Shenzhen Municipality through its investment company (CDG).

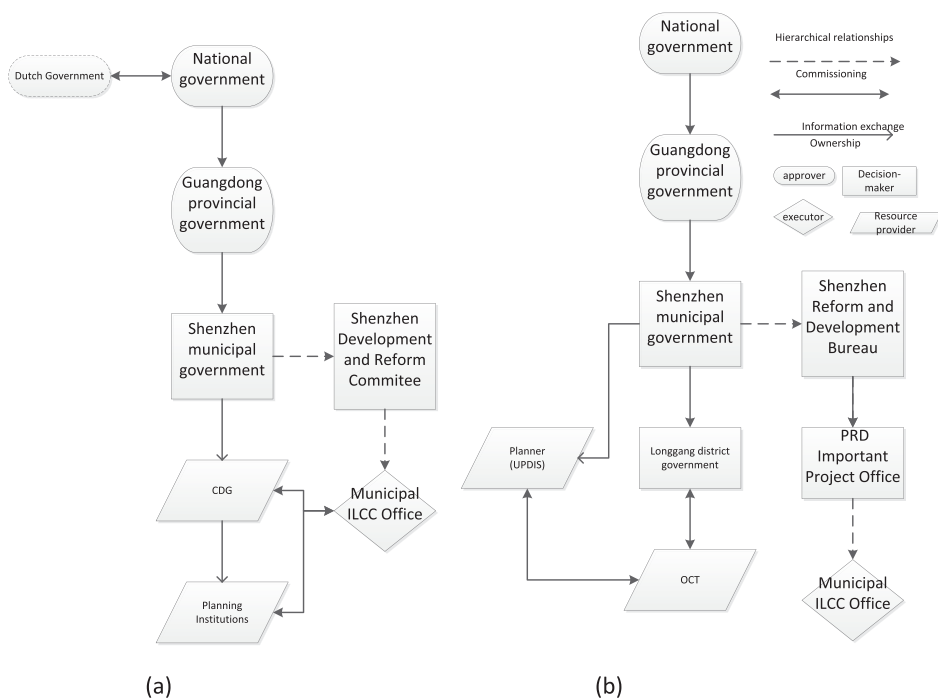


Fig. 6. Actor interdependencies in the agenda setting in the ILCC project (a) before 2017; (b) after 2017.

In the agenda setting arena, the ILCC project reached an impasse due to a limited engagement of the Longgang district government in the beginning. As the Shenzhen municipal government directed the ILCC Office (the steering organization), it was difficult for the Longgang District government to communicate with the ILCC office as an equal party. In 2017, ILCC office was placed under the PRD Important Project Office, which played an even weaker role in the administrative hierarchy because its was only regarded as one of several 'important' projects (interviewee

3). This organization structure paved the ground for more participation from the Longgang district government in this project. In 2017, the Longgang district government signed a contract with the OCT group to develop the 5 km² expansion area, which was a crucial breakthrough event for this project speeding up its progress. The urban planning was still provided by Urban Planning Design Institute of Shenzhen (UPDIS) for the initial and extension areas.

Compared with the Shenzhen case, the actors in the agenda setting in Foshan New Town changed more often during its development. In 2007, the Foshan municipal government decided to develop it into a new town and thus established the Foshan New Town Management Committee as the leading organization. From 2007 to 2011, the new town had been transferred to Lecong Town, and the Management Committee was also administered under the Lecong town government (interviewee 9). However, given the limited financial capacity, the leading role of this new town was replaced by the Shunde district government in 2012. The Management Committee was under the Shunde district government then, still responsible for making decisions on the investments for this project. Compared with the town and district governments, the Foshan municipal government has more resolution to develop the new town, such as the efforts to improve the quality of the design and construction in the initial zone.

The leading administration bureau of Foshan New Town has been transferred from the Foshan municipal government to the town and district governments in last decade (see Fig. 7). The different attitude and financial capacity of these levels of government have resulted in different management styles and cooperation mechanisms with privative actors (interviewee 9). This change led to slow progress and weak implementation. Currently, with limited outside input and lack of clarity from the Shunde district government, the quality of the extension areas of the new town is questionable. Even in the initial zone, real estate projects have occupied a high percentage of the land, and advanced manufacturing and service industries have not yet been recruited.

In the Zhuhai case, the Western City Development Bureau steered Zhuhai Western Eco City, which was led by the Vice Mayor. It is an essential strategic project in the Zhuhai municipal government in the beginning (Interviewee 13). The Western City ¹⁴⁴ Development Bureau covered seven sub-organizations. In 2016, the number of sub-organizations was reduced to three, including Comprehensive Bureau, Coordinating and Planning Bureau and Monitoring Bureau (Interviewee 16).

At the beginning of this project, the Western City Development Bureau was representing the Zhuhai municipal government (See Fig. 8). Different from the ILCC Office in Shenzhen, the Western City Development Bureau could organize urban planning, land transfer, and construction through its corresponding functions of these sub bureaus. Several planning intuitions provided consultancy reports on industrial, environmental and infrastructure development in Zhuhai. Even with

this advantage, it still struggled with limited support from the district governments in the land collection, infrastructure provision and business attraction (Interview 14). In 2016, the Western City Development Bureau changed its steering role to a coordinator, which allows more freedom for the district governments to participate. As two district governments also lead the development of different areas in the new town, other planning or consult institutions are also involved in the planning process.

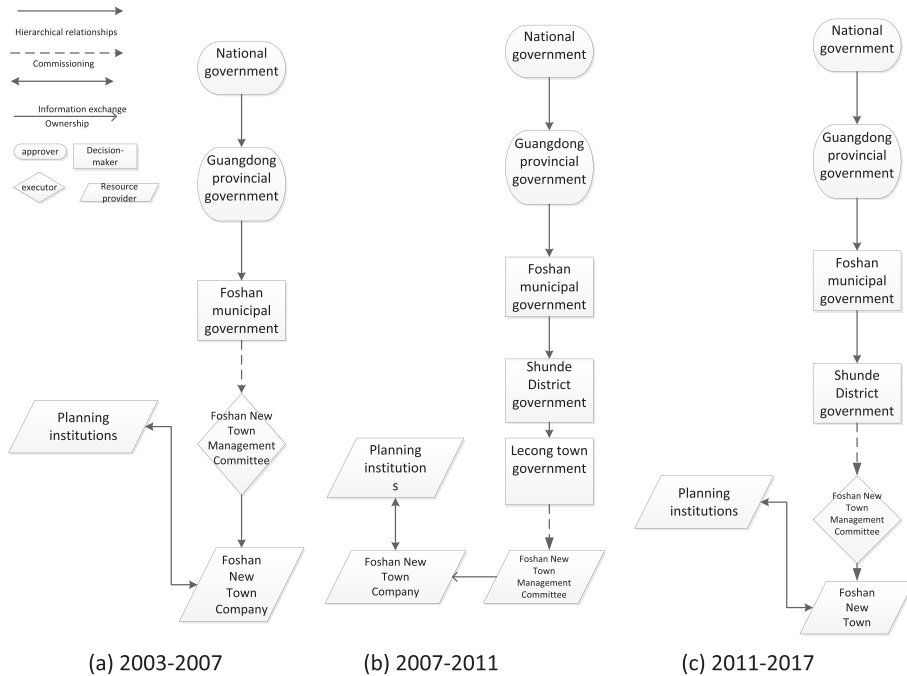


Fig. 7. Organizational structure of Foshan New Town (a) 2003–2007; (b) 2007–2011; (c) 2011–2017.

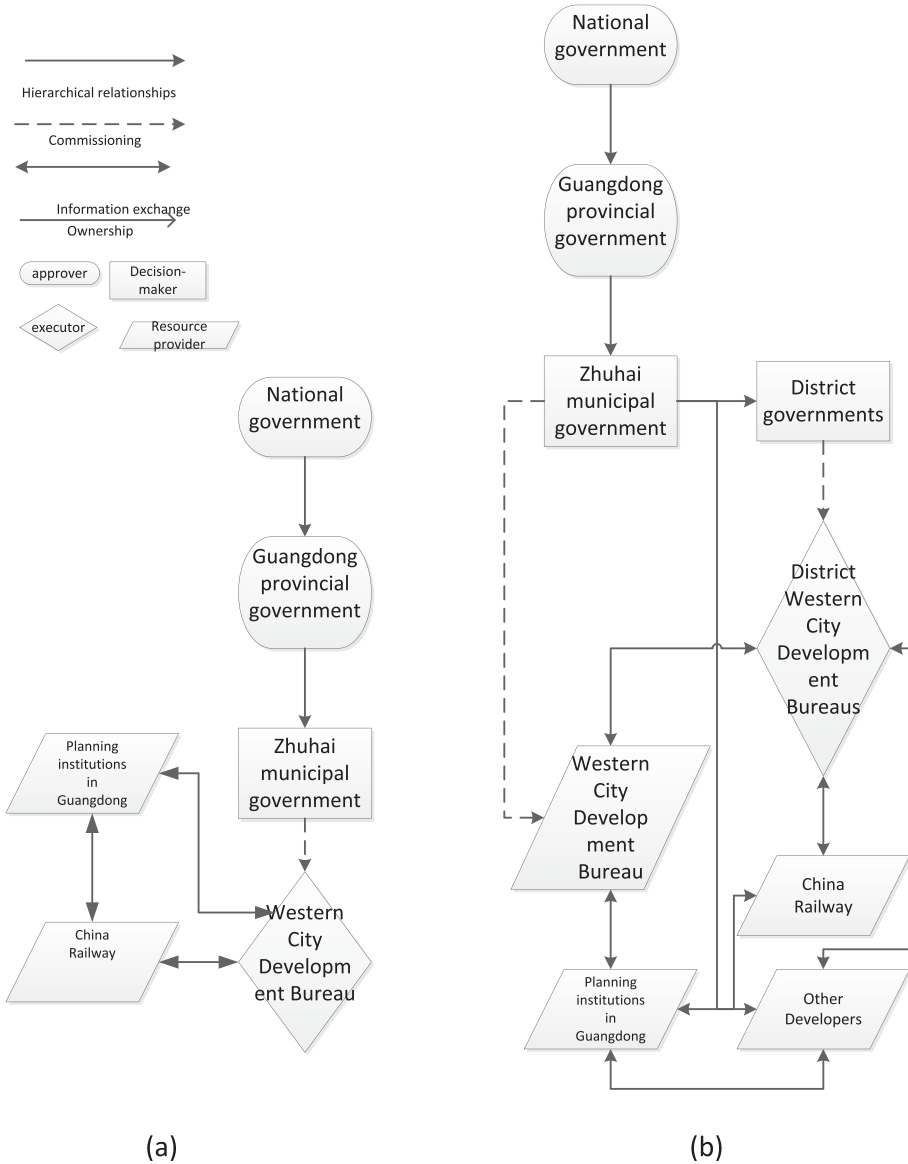


Fig. 8. Organizational structure of Zuhai Western Eco city (a) before 2017; (b) after 2017.

6.2. Actor interdependencies in the land preparation arena

In the land preparation arena, the main actors include approvers (municipal and district governments), financiers (local governments or developers), as well as land providers (villagers).

In the PRD, most villages are wealthy due to the township and village enterprise development. Against the background of fast urbanization, the villages

benefit from revenues derived from renting out land to property developers or firms. Therefore, the villagers are hard to satisfy in the resettlement in Shenzhen, Foshan, and Zhuhai. Officials in three cases all mentioned the difficulty of consulting with villagers (Interviewees 1 and 8).

In Foshan and Zhuhai, the villagers were paid compensation for the resettlement (the processes shown in Figs. 10 and 11 in Section 6.3). The land collection was troublesome because of complaints from villagers regarding compensation levels. After 2016, the Shenzhen municipal and district government have explored a new land transfer policy. Initially, the villagers kept collectively owned land and could not use it commercially (shown in Fig. 9 in Section 6.3). The only option was to transfer the land to the government in exchange for compensation, which alters land titles from collectively owned to state-owned. This new land transfer policy promised the villagers 30% of the land for commercial or residential use instead of fixed compensation. The villagers can gain more benefits by in the land revenue increase in the market, which reduces conflicts on land compensation amounts (Interviewee 4).

Another actor in the land preparation arena is the district government, who played an essential role in communicating with villagers. As the steering organization is commissioned by the municipal government, district governments are also concerned how they can benefit from new town development, delaying progress in the land preparation arena. In Zhuhai, the new town is located in two districts, and the district governments are responsible for resettlement. The resettlement was much quicker in the areas where district governments can benefit from land development (Interviewee 14), as in Shenzhen.

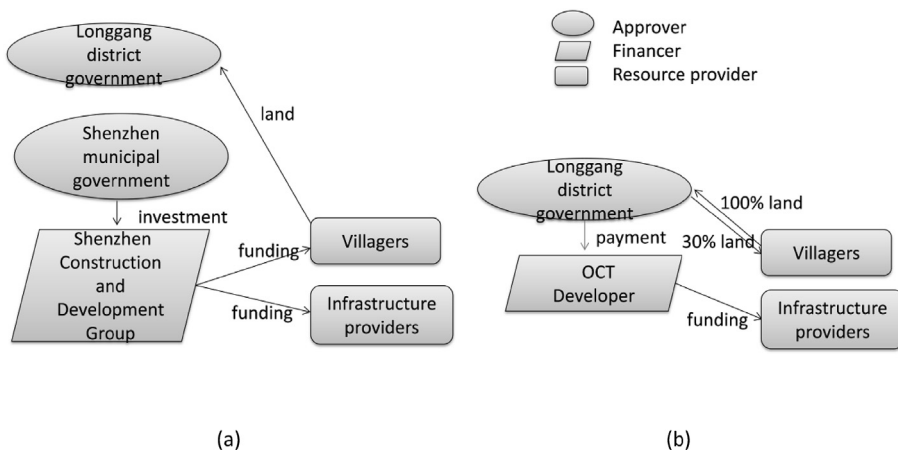


Fig. 9. Actor Interdependency map of Shenzhen ILCC for land preparation and infrastructure provision (a) before 2017; (b) after 2017.

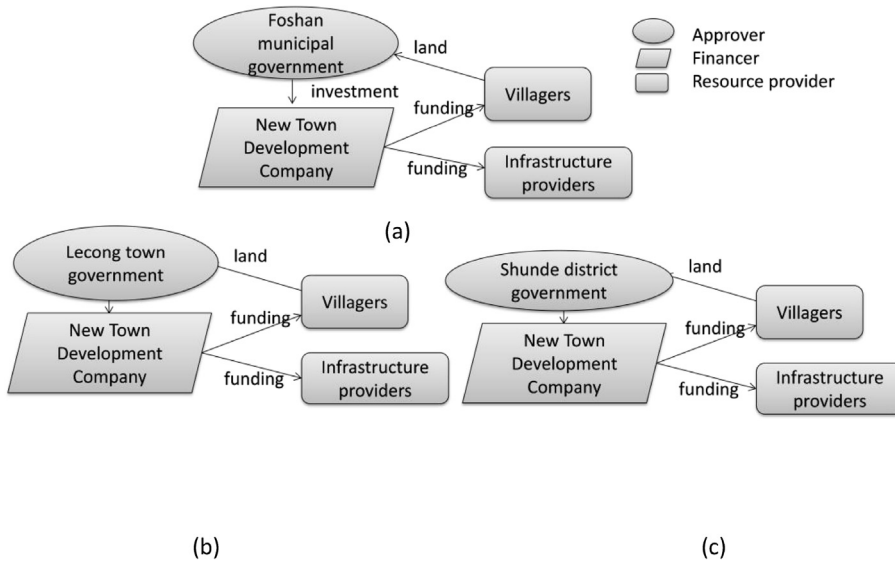


Fig. 10. Actor Interdependency map of Foshan New Town Actor Interdependency map of Shenzhen ILCC for land preparation and infrastructure provision (a) 2003–2007; (b) 2007–2011; (c) 2011–2017.

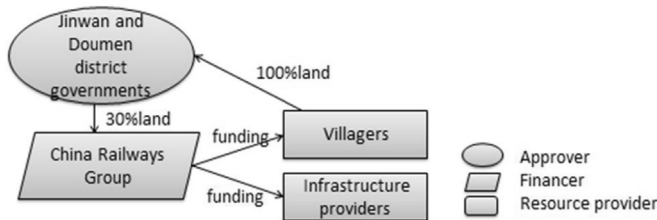


Fig. 11. A Interdependency map of Zhuhai New Town for land preparation and infrastructure provision.

6.3. Actor interdependencies in the infrastructure provision arena

In the land preparation and infrastructure providing arena, the main actors include approvers (municipal and district governments), financiers for the land (local governments or developers), as well as infrastructure providers.

In Shenzhen, the Shenzhen Construction and Development Group (CDG) was chosen by the municipal government as the financier, because it was able as a state-owned financial platform to bear the risks and downplay the importance of profitability. It was established in 2013, thus with limited experience with infrastructure provision. However, its complicated bidding procedure for infrastructure providers was also proven to be a downside ¹⁴⁵ (interviewee 2). Bidding time for

infrastructure providers was quite limited and insufficient for international companies to participate. From 2016, fewer opportunities and tasks have been offered to the CDG in ILCC because the Shenzhen municipal government expected private developers with more market experience could provide the boost for the new town (Interviewee 6). Influenced by this tendency, the Longgang district government signed a contract with a state-owned developer, OCT in 2017.

In the Foshan Case, Foshan New Town Company was separated from the Management Committee as the financier in this project. It is understandable that it had limited resources related to international companies or other partners. In 2011, the leadership of this new town was transferred from the municipal government to the town and later to the district government. The corresponding ownership change of the new town company also led to paralysing instability. The Foshan New Town Company was effectively a helpless tool controlled by different levels of government, without its own position. It provided compensations to villagers and funding to infrastructure providers by bank loans. When land value increased, the local governments would return New Town Company with the land revenue (Interviewee 8 and 11). The quality of the infrastructure depends crucially on financial input from its owner government.

Unlike Foshan, a private developer was involved in Zhuhai as the financier, the China Railways Group.¹ Although it is also a state-owned company, it is an independent one not owned by the 146 Zhuhai municipal government. Lack of coordination can be retraced in their contract. The Western City Development Bureau was responsible for the initial design, and China Railways Group was in charge of the detailed implementation of the project. It was clear that China Railway Company paid for the compensation for villagers and infrastructure, and they could benefit 30% from the land revenues. However, decisions on the budget and engineering projects were jointly made by both parties (Interviewee 13), which resulted in conflicts between the demands from Western City Development Bureau and what the China Railways in fact delivered. To reduce construction costs and benefit their group, the construction companies were selected through internal bids inside the China Railways Group (Interviewee 14). The delay and low-quality selection can be seen back in the project, but it was difficult for the Western City Development Bureau to insist on its requirements because the China Railways Group was an equal partner in the decision making. Although they had divided up the tasks, the Western City Development Bureau was not powerful enough to impose its will in a contract.

1. Separate from the collaboration with China Railways Group, one district government cooperated with a local developer, Huafa Company, to develop one part of the new town, which provided villagers with compensation and funding for infrastructure.

7. CONCLUSIONS

Although eco city, low carbon city and smart city development took off rapidly in China in the past decade, the shortcomings in their implementation have also grown increasingly obvious. In most research this implementation gap is attributed to impasses and complications in realizing overly ambitious visions, unrealistic goals, ineffective policy instruments, and simple reluctance on the ¹⁴⁷ part of local governments (Joss and Molella, 2013; Khanna and Fridley, 2011; Yin et al., 2016). Decision-making processes on eco, low carbon and smart city projects as such have however been sadly understudied, resulting in limited understanding of why urbanization processes do not always proceed in the desired direction. Some scholars do offer a general picture of Chinese decisionmaking and the institutional context in which it occurs, but did not delve into policy-making at the local level (de Jong et al., 2016). In this contribution, three cases in the Pearl River Delta were systematically examined to analyse how specific local network constellations create policy impasses in three important decisionmaking arenas: agenda setting, land preparation and infrastructure provision. It has laid bare what the effects are of resource exchanges taking place (or not) among actors in these arenas and how differential policy network constellations in the three cities lead to differential project progress by ending impasses through breakthroughs (or not).

Compared with other places, the PRD is famous for its market economy and it benefits from the international communication in history. The new towns in the PRD show more private sector involvement, especially international ones. Moreover, eagerness to import knowledge and technology from private actors, especially ones from 'developed countries' is more prominent in the new towns in the PRD, such as Singapore in Guangzhou Knowledge City, and Netherlands in Shenzhen LCC. The variety of involved parties and the complexity of their interdependencies require a networked approach to policy making rather than a simple command and control attitude. As for the role of the central governments, it appeared less active in the PRD region compared with Northern China, such as funding support (Zhan and de Jong, 2017). The municipal and district governments play a prominent role in funding and leadership in the new town development in PRD. Finally, the active participation of villagers is motivated by sharing benefits from real estate and industrial development, which is also a pilot in China.

The three arenas proved to have different bottlenecks that needed to be overcome. In the agenda setting arena, the foundations for fruitful exchanges among actors in Shenzhen were stronger and impasses either did not emerge much or were overcome more easily than the other two cases. In Foshan and Zhuhai, public sector actors admittedly also disposed of less powerful resources, such as funding, support from higher tiers of government and international players with expertise. In addition, fruitful exchange of resources can be prevented by the absence of district

governments where their cooperation for project development, as was real in Zhuhai and Shenzhen. In Foshan, transferring the project from municipal to town and then to an (uninterested) district government still caused further instability.

In the land preparation arena, a potential difficulty was the communication between villagers whose land was required for new town development and local governments and developers who needed this land for new activities. Villagers were rarely eager to move out and change their living conditions. Although this issue emerged in all three cases, Shenzhen seems to have found a solution which directly involved the villagers in the process of new town development and allowed them a financial stake in it. This allowed them to benefit from a portion of the land ownership to be used for commercial use, which ensured legalization of the land titles and profits from land development at later stages.

Funding from developers for infrastructure provision, the third arena, is an indispensable resource in new town development. In many cities, such as Shenzhen and Foshan, local governments establish and own New Town Development Companies. Due to limited experience, these new town companies are often blamed for lacking the required technical and management skills and resources. Private investment is growing increasingly popular in China. Appropriate arrangements can prevent the problems in the cooperation with private investors, such as explicit responsibilities and benefits in the beginning. Local governments that have the financial clout for this may also compensate developers for extra costs they make and deliver facilities which have higher quality and are environmentally friendly. If local governments do not have these financial resources, as is the case in Zhuhai, very little progress is made.

We believe this contribution has led to greater insight into the local specificities of policy networks in sustainable new town development. Wealthier and stronger cities have more resources to overcome impasses and create breakthroughs because the various types of resources they have make fruitful exchanges easier: this is a fundamental inequality in the Chinese administrative system. We see a significant direction for future research in incorporating these deeper lying institutional aspects in the application of policy network theory in China.

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APPENDIX

148 Table A1. Interviewees in Shenzhen, Foshan and Zhuhai new towns in 2015, 2016 and 2017

interviewee No.	Their position and organization	The interview topics
1	The Financial Manager in Shenzhen Construction and Development Group (CDG)	The relationship between Shenzhen municipality and stakeholders in ILCC (Shenzhen, 2015); The finance of land and infrastructures in ILCC project (Shenzhen, 2016)
2	The Market Manger in CDG	The relationship between Shenzhen municipality and CGD in the ILCC (Shenzhen, 2016); The operation of CDG in ILCC project (Shenzhen, 2015); and current status of industrial development (Shenzhen, 2017)
3	The Bureau Head of Urban Planning Design Institute of Shenzhen (UPDIS)	The change of ILCC office in the governance of ILCC project (Shenzhen, 2017)
4	The Chief Planner for ILCC in UPDIS	The land transfer mode as a pilot in ILCC (Shenzhen, 2017)
5	The Manager in Design Shenzhen Center (DSC)	The mechanism of ILCC project, including leadership, financial subsidy and organization mode (Shenzhen, 2016)
6	The Deputy Director in ILCC Office in Longgang District	The vision and development strategies of ILCC (Shenzhen, 2015); The involvement of Longgang district in LCC (Shenzhen, 2016)
7	The Chairman in International Low Carbon Research Center	The history of ILCC project (2015 and 2016); The role of public and private actors in ILCC project (Shenzhen, 2016); The progress of ILCC project in the extension zone (Shenzhen, 2017)
8	The Bureau Director in Foshan New Town Company	The cooperation with villagers and funding of new town development (Foshan, 2016)
9	The Manager for Sports and Cultural Complex in Foshan New Town Company	The relationship of new town company with different levels of governments in Foshan (Foshan, 2016)
10	The Researcher in South China University of Technology (SCUT)	The impact of government on New Town (Foshan, 2017)
11	The Professor working on Foshan Urban Plan in SCUT	The History of Foshan New Town (Foshan, 2016)
12	The Chair in Zhuhai Planning bureau	The History of Zhuhai as an Eco city (Zhuhai, 2016)
13	The Chair in Zhuhai Western City Development Bureau	The background of this new town; the relationship between governments and developers in new town (Zhuhai, 2016)
14	The Officer in Zhuhai Western City Development Bureau	The relationship between government and developers (Zhuhai, 2016)
15	The Officer in Construction bureau of Doumen District in Zhuhai	The relationship between Zhuhai municipality, Doumen District and Jinwan District (Zhuhai, 2016)
16	The researcher from Hong Kong City University	The current governance structure of Western Eco City Bureau (Zhuhai, 2017)

Table A2. New Towns Located in the Pearl River Delta with National or Provincial Support (Lu et al., 2017)

City (Number of new town located)	New Town Name (from Urban Master Plan)	Support program
Guangzhou (3)	Guangzhou Knowledge City Guangzhou International Innovation City Mingzhu Bay in Coastal City in Nansha	Pilot for National Smart City (Ministry of Housing and Urban-Rural Development, or MOHURD) National Modern Service Industry International Innovation Park, approved by National Science Ministry National Free Trade Zone; Demonstration area for cooperation between Guangdong, Hong Kong and Macau
Shenzhen (3)	Qianhai Shenzhen International Low Carbon City	National Free Trade Zone; Modern Service Industry Pilot (Ministry of Finance and Commerce)
	Guangming Phoenix Town	Pilot National Low Carbon City (National Development and Reform Committee)
Foshan (1)	Foshan New Town	Pilot National Sponge City (Ministry of Finance, MOHURD, Ministry of Water Resources)
Zhuhai (2)	Hengqin	Pilot China-EU cooperation urbanization demonstration (MOHURD and EU)
	Zhuhai Western Eco City	National Free Trade Zone; pilot for National Low Carbon City (National Development and Reform Committee)
Zhongshan (1)	Cuiheng New District	Pilot China-EU cooperation urbanization demonstration (MOHURD and EU)
		pilot for National Smart City (MOHURD)

Note: the list of Urban Master Plans can be found in the reference (DG Municipality, 2000; FS Municipality, 2012; GZ Municipality, 2011; HZ Municipality (2006–2020), 2006; JM Municipality, 2011; SZ Municipality, 2010; ZH Municipality, 2001; ZQ Municipality, 2010; ZS Municipality, 2005).

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