

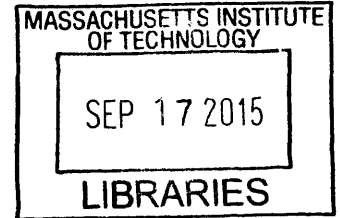
Establishing Transit-Oriented Development (TOD) on the Ground:  
Case-based Analysis of Implementing TOD in China

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ARCHIVES



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## **ABSTRACT**

While the study of Transit-Oriented Development (TOD) in China has been under way since the 1990s, effective examples of TOD in practice remain scarce. This research conducted 41 semi-structured interviews and applied the Policy-Program-Implementation Process (PPIP) model to identify the challenges to TOD implementation—which are found throughout the entire process, from general acceptance, to urban planning capacity and regulations, to government administration and the real estate market. Misunderstanding and incomplete understanding prevent people from fully adopting the idea of TOD. In planning and design, main challenges are in the form of conflicts between current planning regulations and TOD planning techniques. Regarding the public sector, institutional coordination will not become a major barrier once a strong leadership in the municipality is in support of TOD; but there are still barriers in the administrative regulations and financing mechanisms. In the real estate market, great challenges come from developers who hesitate to take the risk to introduce the new type of TOD product. In order to establish successful TODs on the ground in Chinese cities, this research recommends the following solutions. First, effective TOD training programs need to be carried out. Second, the planning codes should be reviewed and revised to establish the legitimacy of TOD. Third, economic incentives and ongoing revenue resources for the government are needed to reassure real estate developers and also provide sustainable economic solutions for the government. Fourth, institutional structure needs to be developed in both administrative and development processes to reduce the institutional barriers and internalize the economic benefits in the TOD implementation.

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# Chapter 1 Background

## 1.1 Transit-Oriented Development (TOD) and Its Benefits

The concept of Transit-Oriented Development (TOD) originated in North America in the early 1990s, as a reflection on problems in urban development, such as low-density urban sprawl, which are associated with dependence on the automobile as the main transportation mode. However, TOD is not a new idea, because before the automobile started to be widely used in the 1920s, walkable, mixed-use communities had been prevailing since the late 19<sup>th</sup> century along the streetcar lines in many cities in the U.S. The urban form at that time was laid out to accommodate the main transportation modes of walking and transit, which also fostered market demand for pedestrian-oriented, small-grid road networks.

When the auto industry started booming in the 1920s, the use of automobiles mushroomed and undermined the market forces that used to cause TOD to be the natural market solution. The walkable urban environment no longer fit into the needs of auto-oriented development and hence the benefits and costs of transit-oriented urban form became external to the market forces, which now turned to favoring the needs of the automobile. Today, government regulation and finance policy to promote TOD are necessary to address the externalities of the market, reducing the negative impacts caused by automobile dependence. In fact, the automobile cannot support a sustainable urban form, which needs to be compact and have relatively high density. Pushkarev and Zupan (Pushkarev & Zupan, 1977) have found that there is a limit to auto access into very high

density areas and the limit is dictated by the character and extent of available space for auto movement and for parking; the surplus trips that exceed the limit of automobile use should be handled by public transit.

The main objectives of TOD are to promote smart growth, leverage economic development, and also to both shift and accommodate market demand and lifestyle preferences. Different scholars have viewed and defined TOD differently. Peter Calthorpe (Calthorpe, 1993) defined the TOD concept as moderate and high-density housing and public uses concentrating in mixed-use developments along the regional transit system. Cervero and Kockelman (Cervero & Kockelman, 1997) defined the three main planning principles: density, diversity of uses, and design of pedestrian-friendly environments at the transit station areas. In general, the most common traits of TOD are compact, mixed-use development near transit facilities with high-quality walking environments.

The benefits of TOD are wide-ranging, covering transportation, economic, and social concerns. The most direct benefit is to encourage people to use public transit by integrating high-density developments with mass transit stations, and hence increasing the ridership of the transit and inhibiting urban sprawl. Research shows that residents living near transit stations are five to six times more likely to commute via transit than other residents who do not live near stations (Cervero, 2004). By encouraging multi-modal transportation, TOD can help to relieve the congestion problem. The economic benefits of TOD not only include the increased fare revenue of transit systems due to the increase of ridership, but also the increase of land value in the surrounding areas of transit stations by increasing the accessibility, density, and other gains from the joint



development of residential, commercial, office, and transit facilities. Furthermore, TOD can also bring social benefits by creating pedestrian-friendly environments and active street life to enhance the urban environment.

## **1.2 Urbanization and Motorization in China**

In the past 30 years, China has been experiencing rapid urbanization. The ratio of the population living in the urban area of the total population has increased from 19.4% in 1980 to 53.2% in 2013 (World Bank online database<sup>1</sup>). Along with the rapid urbanization, the built-up area of the cities has also expanded greatly. From 1981 to 2010, the total urban construction land increased from 7,438km<sup>2</sup> to 40,058km<sup>2</sup>, with an annual rate of increase of 6.02% (Qu, Sun, & Chen, 2014).

The growth of urban population and the expansion of the urban space have resulted in remarkable change in people's travel behavior. Taking Beijing as an example, according to the data in the Annual Report of Beijing Transportation Development,<sup>2</sup> the number of daily trips (excluding walking) in the urban area was 16.05 million in 2001; it increased dramatically to 30.33 million in 2012. The increases of trips and automobile ownership have been going hand in hand. The total number of vehicles in Beijing rocketed from 1.70 million in 2001 to 5.20 million in 2012. From 1986 to 2012, the mode share of the automobile had surged from 5% to 32.6%, while the mode share of biking had declined from 62.7% to 13.9%. At the same time, the mode share of transit (including bus and

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<sup>1</sup> <http://data.worldbank.org/>

<sup>2</sup> Beijing Transportation Research Center: <http://www.bjtrc.org.cn/>

subway) had increased significantly from 28.2% to 44%, largely due to the rapid growth of the mode share of subway from 1.7% to 16.8%.

The rapid urbanization and motorization, on the one hand, rely on economic growth. On the other hand, they have led to negative impacts on many Chinese cities: air pollution, traffic congestion, the worsening of livability, etc. Automobile manufacturing, which has become a pillar industry of many major cities in China, also plays an important role in the motorization. At the same time, these cities are also facing highly challenging congestion problems. Researchers have found that, in Beijing, traffic-related emissions and combustion sources are the two major contributions to the types of particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) that are the main factors in air pollution (Z. Liu et al., 2014).

Facing these great challenges in urban development, professionals in the field of urban planning in China have been trying to investigate planning and design solutions to address the problems, such as Smart Growth, low-carbon urban planning, Compact City, and many other planning concepts. Among all these planning ideas, Transit-oriented Development (TOD) is one of the most popular planning concepts that has been studied in planning practice.

TOD was introduced to China in the mid-1990s, and the application of the TOD concept in China was synchronized with the urban mass transit development in the country. Until the 1990s, Beijing and Tianjin were the only two cities in China that had subway systems. However, since the late 1990s, more and more Chinese cities have started to build their rapid rail-transit systems, in order to meet the increasing travel demand of the growing urban population and to mitigate the traffic congestion, air pollution, and other negative

impacts of motorization. By 2014, 22 cities in mainland China had their rail-transit systems in operation, and another 15 urban rail systems were under construction.

Similarly, since the first Bus Rapid Transit (BRT) line was completed in Kunming in 1999, about 20 cities have built BRT systems.<sup>3</sup>

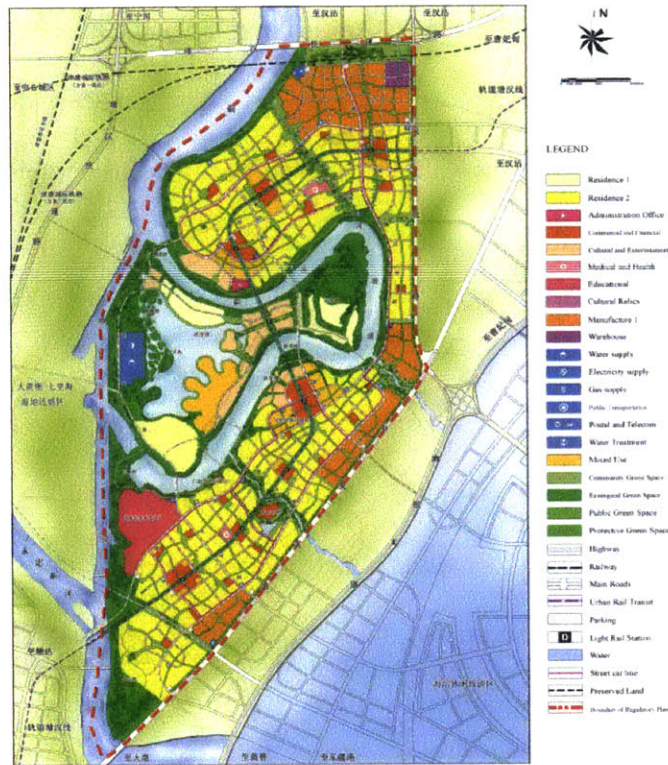
### **1.3 TOD Planning Practice in China**

The rapid growth of urban mass transit in Chinese cities has provided great opportunities for the application of TOD. Tianjin Eco-city is one pilot planning case that has applied the TOD concept in both its master plan (2008) and its regulatory plan (2009). Tianjin Eco-city is planned to be compact, with a good mix of land uses. A planned light rail line is to connect different districts in the Eco-city. Office buildings and retail centers are located close to the light rail transit stations while residential blocks are distributed around these commercial and business centers, creating a TOD pattern.

However, as of the end of 2014, the planned light rail in Tianjin Eco-city has not been built, and most of the developments are residential areas. The goal of TOD is still waiting to be fulfilled. Li et al. (2013) have pointed out several problems in the implementation of green transportation planning in Tianjin Eco-city: 1) the job-housing balance was not achieved; 2) the planned small blocks were not implemented; 3) the public transit service was insufficient; 4) the design of roadways did not pay enough attention to the pedestrian and bicycle; 5) the street life was not active; and 6) the developers acquired land on a large scale and hindered the non-motorized transportation system.

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<sup>3</sup> <http://www.chinabrt.org/>



**Figure 1. Land-use in Master Plan of Tianjin Eco-city**

(Source: Beijing Tsinghua Urban Planning & Design Institute) (Zheng, Liu, & Liu, 2013)

Since 2002, Shenzhen has started to apply the TOD concept into a hierarchical planning structure. Lin and Zong (LIN & ZONG, 2006) introduced there the methodology of TOD planning practices, which covers the macro, meso, and micro levels. They pointed out that the TOD plan in Shenzhen has been integrated into the statutory plans; however, to implement the TOD pattern requires reforms in planning, financing, construction, and operation. Shao et al. (Shao, Tian, Lu, & Zhang, 2011) proposed TOD strategies in Shenzhen with regard to the planning theme, methods, criteria, management, and land-use right leasing. The planning practice in Shenzhen shows that the local planners have developed a comprehensive planning methodology to integrate TOD into the current planning system. In terms of the planning implementation, Shenzhen also accomplished

satisfactory outcomes. The Luohu Land Port and Train Station project won the Awards for Excellence in Asia Pacific area in 2006 given by the Urban Land Institute.<sup>4</sup> This award recognized the pedestrian environment and well-organized traffic flows in the highly compact area of the rail station and border.

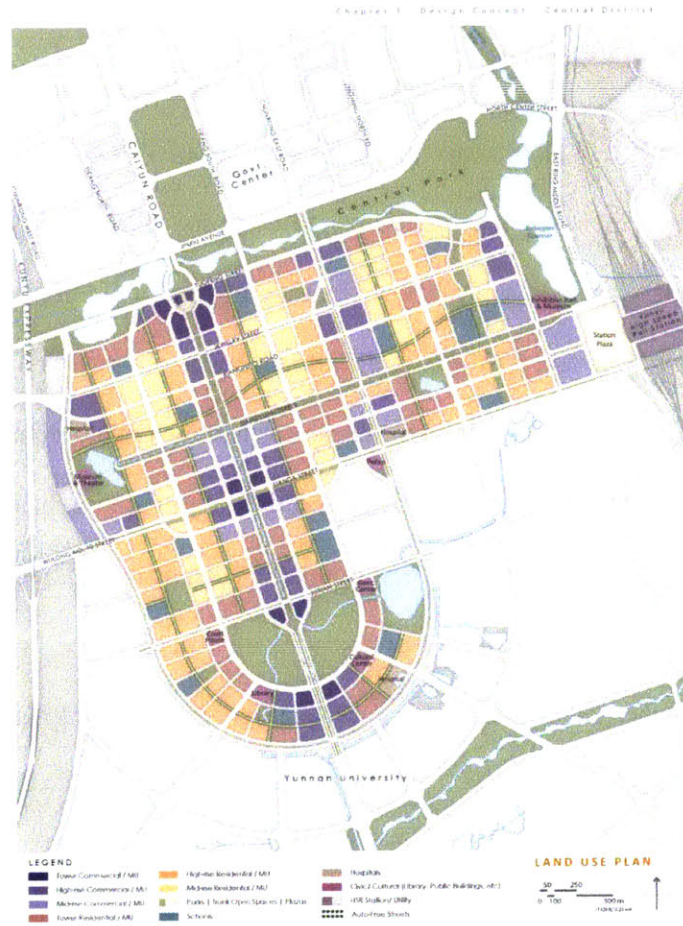
The cases of Tianjin and Shenzhen are just two examples of TOD planning practice in Chinese cities. While Shenzhen has demonstrated some successful outcomes of TOD planning, the case of Tianjin Eco-city shows that there is still a big gap between the planning proposal and the real built-up environment. In fact, in many cities that have mass transit systems in operation, the transit stations and the developments around them usually do not have proactive integration; and the lack of integration has negative impacts on both transit and the surrounding city environment, such as insufficient use of both directions of transit and inconvenient pedestrian transfer. In this case, the unintegrated development is often called Transit-Adjacent Development (TAD) rather than TOD (Lu, H and Zhao, J, 2009; Zhang, 2007).

In addition to local planners, foreign professionals also have played an important role in the practice of TOD planning. Since 2000, Peter Calthorpe, the leading urban planner in TOD and New Urbanism in the U.S., has conducted many conceptual planning projects in Beijing, Kunming, Zhuhai, Jinan, etc. In some of the TOD planning projects, Peter Calthorpe worked with the Energy Foundation and the Energy Foundation's technical support partner—the China Sustainable Transportation Center (CSTC). The present

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<sup>4</sup> <http://uli.org/awards/uli-awards-for-excellence-winners-through-the-years/>

author formerly worked at CSTC, and this working experience has provided him with opportunities to participate in the TOD planning and implementation process.



**Figure 2. Chenggong TOD Conceptual Plan, Kunming**

(Source: Calthorpe Associates and the Energy Foundation, *Chenggong Low Carbon City*, 2011)



**Figure 3. New East Station TOD Conceptual Plan, Jinan**  
 (Source: Calthorpe Associates and the Energy Foundation, *Jinan New East Station TOD Conceptual Plan*, 2013)

The process, in which a TOD conceptual plan is transformed into a statutory plan, provides a unique angle from which to examine the TOD implementation. Due to the planning regulations in China, the statutory plans, including the master plan and regulatory plan, must be finished by Chinese planning institutions, with qualifications. Foreign planners can carry out the conceptual plans. If a conceptual plan has been approved by the local governments, then it needs to be further developed into statutory plans for implementation by local planning institutions. As of the end of 2014, some of the conceptual plans that were proposed by Peter Calthorpe and his team from Calthorpe Associates have been carried forward into the regulatory plan, which is the counterpart in China of zoning in the U.S. In the two case-cities of this study, the regulatory plan of Chenggong core area in Kunming has been finished and approved; and the regulatory plan of the New East Station area in Jinan is still in progress. Regarding the mass transit

systems, Kunming has two subway lines in operation and one of them travels through the core area of Chenggong, connecting it to downtown Kunming. The Jinan New East Station area has not yet built any of the planned rail transit lines and BRT lines.

In Calthorpe's TOD conceptual plans in China, including Kunming Chenggong TOD Conceptual Plan and Jinan New East Station TOD Conceptual Plan, Peter Calthorpe proposes eight TOD principles<sup>5</sup> as follows:

- i. Develop neighborhoods that promote walking;
- ii. Prioritize bicycle networks;
- iii. Create dense networks of streets and paths;
- iv. Zone for mixed use neighborhoods;
- v. Support high quality transit;
- vi. Match density to transit capacity;
- vii. Create compact regions with short commutes; and
- viii. Create energy-efficient buildings & community systems to reduce carbon emissions.

According to an interview with Peter Calthorpe, these eight principles received different acceptance from the municipal governments in the different Chinese cities: *“In different cities, I have received different responses. In Beijing, I didn't receive the response in a big positive way. Many other cities were self-selected. In many other cities we work through the Energy Foundation. Once they already said they liked the TOD idea, they were completely receptive”* (Calthorpe, personal interview, 23 February 2015). In cities where the TOD principles were accepted, however, when it comes to the detailed planning

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<sup>5</sup> The source of the planning documents is Calthorpe Associates and the Energy Foundation.



techniques which are embedded in these principles, people often hold different opinions on the specific planning. The critical techniques of TOD planning include small-grid road network, mixed land use, high density in mass-transit service areas, etc. The small-grid road network and mixed land use are the two major planning techniques that often arouse controversy. As Peter Calthorpe stated, *“I think two principles are primary. One is the small block, which is contradictory to the gated community, single-use privacy zones. And the other one is the quantity of commercial. They tend to not see commercial development at the scale we do at transit stations”* (personal interview, 23 February 2015). Taking the small-grid road network as an example, in TOD planning, the average block size is about 100 to 150 meters, but this size contradicts the traditional planning doctrine of road spacing and even has conflicts with some existing planning codes in China. Hence, it often raises questions from government agencies and some urban planners in China. Moreover, developers also sometimes have negative opinions about the small-grid road network, especially for residential development.

TOD has been introduced, studied, and applied in planning practices in Chinese cities. At the same time, there are barriers and challenges in the process of implementing TOD. The challenges and barriers to TOD in planning practice will be discussed in detail in the following chapters.

# **Chapter 2 Literature Review and Research**

## **Framework**

### **2.1 TOD Planning in the Literature**

#### **2.1.1 Studies on TOD Impacts**

Successful TOD outcomes can be found in many countries on the global stage. Cervero (Cervero, 2006) cites several exemplary cases, such as the well-known “Finger Plan” of Copenhagen in Denmark, which is widely recognized as a model of the integration of land use and rail transit corridors, and the balanced growth of transit and land use in Stockholm, Sweden, showing the benefits of the mixed use and job-housing balance in TOD. The “Constellation Plan” and rail-oriented new town development in Singapore represent a successful TOD in Asia. The BRT systems in Bogotá, Colombia, and in Curitiba, Brazil, provide a more affordable pattern of TOD in developing countries. In the U.S., where the concept of TOD was first proposed, the Rosslyn-Ballston corridor on the Metrorail Orange line in Arlington County remains one of the most representative TOD examples in the U.S. since the automobile became widely used. In fact, there are many historical neighborhoods in cities like Boston and Philadelphia that still retain the characteristics of TOD, having been established during the time of streetcars in the late 19<sup>th</sup> century to early 20<sup>th</sup> century.

To evaluate the performance of TOD, many studies look at how the built environment influences travel behavior. It is generally accepted that density, mixed land use, and

pedestrian-oriented designs in TOD reduce trip rates and encourage non-auto travel in statistically significant ways (Cervero & Kockelman, 1997). One goal of TOD is to encourage the use of public transit and non-motorized transportation while reducing automobile use. Ewing and Cervero (Ewing & Cervero, 2010) found that the combined effect of several built environment factors has statistically large impacts on travel behaviors. Vehicle-miles Traveled (VMT) is strongly related to the accessibility to destinations and street network design. Walking is related to land use diversity, intersection density, and the number of destinations within walking distance. The proximity to transit, street network design, and land use diversity are factors that influence transit use.

Many studies show the TOD impacts that are leveraged by BRT systems. In Bogotá, higher BRT boardings were found to be related to the environmental support for walking and the environmental barriers to using a car (Estupiñán & Rodríguez, 2008). A study of Jinan BRT concluded that people walk farther to BRT stations when the walking environment has certain features like median transit-way station locations and shaded corridors (Jiang, Christopher Zegras, & Mehndiratta, 2012). Levinson et al. (2002) have claimed that Ottawa, Pittsburgh, Brisbane, and Curitiba demonstrated that BRT has an impact on land use similar to that of rail transit.

A number of studies have assessed the capitalization benefits. The capitalization benefits were captured in Brisbane (Levinson et al., 2002), Pittsburgh, Boston, Bogotá (Rodríguez\* \* & Targa, 2004), and Seoul (Cervero & Kang, 2011). In Los Angeles, the land value impacts were very small and accrued only for commercial parcels (Cervero,

2006). However, a study in Beijing found no significant capitalization benefits on residential properties at the BRT station areas (L. Ma, Ye, & Titheridge, 2013).

However, the existence of a mass-transit corridor is not always associated with changes of the built environment in the surrounding areas that could be recognized as TOD. In a recent study of Bogotá, Cervero and Dai (2014) found that the urban density growth in the BRT corridor areas was even lower than in other areas in the city. Similarly, in Ahmedabad, few significant changes on urban development happened in the BRT station areas. Suzuki et al. argued that Bogotá and Ahmedabad did not make their BRT systems play a positive role in city-form shaping, but only treated BRT as a tool for improving mobility (Suzuki, Cervero, & Iuchi, 2013).

Regarding research on TOD in China, Chinese researchers have started to study and introduce TOD since around 2000. Chen and Peng (2007) looked at the community scale and claimed that TOD should be a fundamental solution to urban transportation problems. Ma (Q. Ma, 2009) presented the holistic aspects of TOD and provided an update on the progress of TOD in the U.S., including the 3D principles in transit station areas—Density, Diversity, and Design, land use of TOD, and the size of TOD areas.

Some recent studies on TOD in Chinese cities have examined the rail transit-affected areas. In a study in Shanghai, Cervero and Day (Cervero & Day, 2008) pointed out that relocating to the suburban area near a urban rail station will moderate the decline of job accessibility and encourage switches from non-motorized to transit commuting. Mu and Jong (Mu & Jong, 2012) identified the “critical” and “important” conditions for effective TOD, based on the experiences and research on TOD mainly outside China. The authors

drew the conclusion that an effective TOD in Dalian would be possible only if all the critical and important factors could be achieved. Furthermore, the authors claimed that most Chinese cities are at the early stage of TOD, and that targeted policies, led by governments, are essential for promoting TOD.

### **2.1.2 Studies on TOD Implementation**

While most studies have focused on the impacts of TOD regarding physical environment and travel behavior, a few studies have investigated the implementation mechanism of TOD. Cervero et al. (Cervero, Murphy, Ferrell, Goguts, & Tsai, 2004) conducted a comprehensive assessment of the practice experience and benefits of TOD and joint development throughout the U.S. through interviews, surveys, and case studies. They concluded that the main benefits of TOD included increased ridership and revenue, revitalization of declining neighborhoods, financial gains from development, increased housing supply, and congestion relief. In terms of the barriers to TOD implementation in the U.S., they identified three types of barriers: 1) fiscal barriers, such as higher cost and risks of dense development and minimal development potential on low-cost transit corridors; 2) political barriers, like “not-in-my-backyard” (NIMBY) resistance from localities; 3) organizational barriers, such as the coordination problems among multiple actors and stakeholder groups with different focuses.

Beyond the experience in the U.S., by summarizing several successful TODs around the world, Cervero (2006) argues that TOD needs to confer both public and private benefits and establish public-private partnerships to advance TOD implementation. He also points

out that leadership, which should be combined with planning vision and market pricing, is the necessary complement to make TOD a viable and sustainable form.

In a case study of Jinan, China, Thomas and Deakin (Thomas & Deakin, 2008) analyzed the physical land use challenges to implementing TOD in a built-up area along a planned BRT corridor. They found that auto-oriented land use caused conflicts among vehicles, bikes and pedestrians; excessive spacing between pedestrian crossings; super blocks and a lack of secondary roads, constraining the accessibility of all modes; unregulated surface parking, blocking pedestrians but encouraging driving.

Smith and Raemaekers (Smith & Raemaekers, 1998) not only examined the degree of integration between land use and transportation in Curitiba, but also looked at the implementation mechanism. They pointed out that the implementation has been both proactive—with a clearly defined model—and interactive—with a continuous process of feedback between planning and implementation. They claimed that the successful Curitiba model depended on institutional strength, coordination, political support, and the control over allocation of land.

Boarnet and Compin (Boarnet & Compin, 1999) emphasized the importance of TOD research not only looking at the vision but also the details of the implementation process. Through in-depth interviews with the local planning directors and reviewing the planning documents in San Diego County in the U.S., they pointed out that the progress towards TOD goals is often incremental. The speed of this progress depends on whether local conditions are consistent with TOD goals. They identified the main barriers to TOD implementation in San Diego County as the constraints imposed by existing rights-of-

way, the difficulties of dealing with existing land use, market conditions, and fiscal and economic disincentives.

Regarding the Chinese literature, most of the studies have been looking at methodology in TOD planning formulation, and the in-depth analysis of TOD implementation has been inadequate. X. Liu (X. Liu, 2008) pointed out that the contradictions between transportation congestion and land development could be caused in the planning formulation phase, but also from the planning implementation phase; the development, administration, and policy regulation are three key factors that have great impacts on the integration of transportation and land development. Implementing TOD cannot only rely on the planning and design of the physical environment; supporting public policies, including planning, laws, pricing, and promotion, are critical (Z. Li, Peng, Song, & Chen, 2011).

To summarize the findings in the literatures of TOD implementation, the critical issues for a successful TOD are the market demand and incentives to overcome the fiscal barriers, political support and leadership to facilitate institutional coordination, and planning vision and capacity to address the existing auto-oriented land use.

## **2.2 Implementation in the Literature**

If we step out of the specific field of TOD, we can find that “implementation studies” in a broader sense have started with Pressman and Wildavsky’s landmark 1973 book *Implementation* (Pressman & Wildavsky, 1973). They defined “implementation” in their book as: “to carry out, accomplish, fulfill, produce, and complete . . . a policy”. They

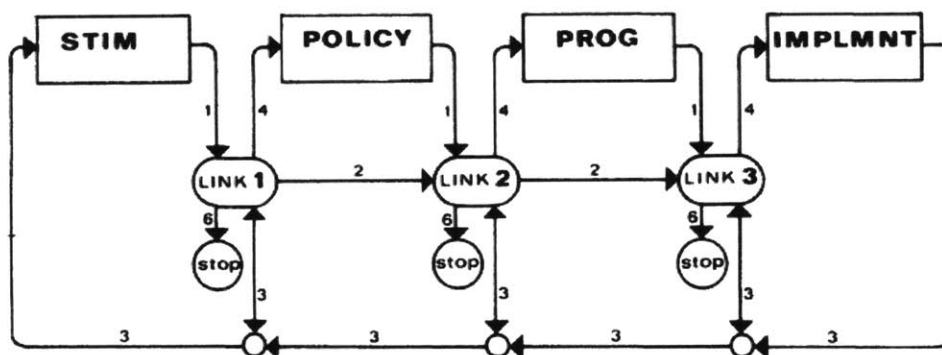
argued that a policy is a hypothesis containing initial conditions and predicted consequences; implementation “does not refer to creating the initial conditions,” and “is the ability to forge subsequent links in the causal chain so as to obtain the desired results.”

As Talen (Talen, 1996) pointed out, while implementation had been studied in the areas of political science, public administration, and management science, there had been a lack of parallel investigation into the implementation process in the planning field; and planning needs to have its own evaluation research which reflects the physical and spatially referenced perspective of planning. Talen (Talen, 1996) argued that it is important to draw a distinction between *planning* implementation and *plan* implementation, because if planning itself is regarded as a process, then implementation is implicit, as planners are engaged in the action of implementation. Talen’s research was focused on the latter: To what degree have plans been fulfilled? She developed a typology of four categories of planning evaluation: 1) evaluation prior to plan implementation, 2) evaluation of planning practice, 3) policy implementation analysis, and 4) evaluation of the implementation of plans.

Many studies investigate the fourth category Talen distinguished: evaluating the outcomes of plan implementation. However, the meaning of success in implementation varies according to different researchers’ viewpoints. There are two distinct conceptual poles of a successful implementation: at one end is the strict “linear” or “top-down” implementation, judged by evaluating the degree to which outcomes conform to policy (Wildavsky, 1973); at the other end, mere consultation of a plan could indicate a successful implementation (E. Alexander & Faludi, 1989).



E. R. Alexander (1985) argued that implementation is an ongoing dynamic of policy development, modification, and execution and developed the PPIP (Policy-Program-Implementation Process) model to illustrate the continuous process of implementation (Figure 4). The PPIP model provides us a view of planning in which we can integrate policy, planning, projects, and programs, operational decisions, implementation and implementation decisions, and the outputs, outcomes, and impacts of plans and their implementation (E. Alexander & Faludi, 1989).



**Figure 4.** The Policy-Program-Implementation Process (E. R. Alexander, 1985)

*Note: In this model, implementation process is illustrated as a sequential process that may be continuous from its beginning as the result of some stimulus (STIM), and through its stages of policy development (POLICY), planning or program design (PROG), to its conclusion in implementation (IMPLMNT). Each stage is connected to its following one by a "link". Link 1 is the policy formation environment, where the original stimulus is transformed into policy; Link 2 is the arena of program specification, where policy is elaborated into regulations or detailed into program or project designs; Link 3 is the field implementation environment, the arena where field officials or contractors turn program requirements into concrete actions. Between the stages and links, there are a number of*

*arrows that represent the alternative paths the process can follow at that point* (E. R. Alexander, 1985).

E. R. Alexander (1998) emphasized the importance of institutional design in implementation by investigating the missing link between planning and implementation. By comparing two cases from Israel and the Netherlands, he identified three key problems to address in planning implementation: the first one is to integrate the particular objectives of different sectors with the concerns at the broader strategic level; the second is to invite interaction and participation in a timely fashion; the third is to coordinate different organizations. He also points out that cultural, political, economic, and institutional contexts have a critical impact on the institutional design in planning implementation.

Focusing on the permit review phase, Berke et al. (Berke et al., 2006) concluded that the deterrent enforcement style in implementation was more effective to achieve successful outcomes under both performance-based and conformance-based approaches. They also pointed out that planning implementation should include the broad connections between different governance arrangements and programs in order to ensure a favorable outcome. Laurian et al. (Laurian et al., 2004) identified the key factors in plan implementation: the quality of the plan, the capacity and commitment of land developers to implement plans, the capacity and commitment of the staff and leadership of planning agencies, and the interactions between developers and the agency; and they concluded that the main driving forces of plan implementation were the resources of planning agencies and the quality of plans, rather than the characteristics of developers.

In Chinese literature, studies of planning implementation mostly focus on the evaluation of the implementation of statutory plans, especially the city master plan. Zhao (M. Zhao, 2000) claimed that the plan implementation is the public policy implementation and has the political, financial, legislation, and social mechanisms of implementation. The subjects in planning implementation include the government agencies, developers, residents, and urban planners (W. Ma & Wang, 2010). G. Zhou (G. Zhou, 2007) applied the New Institutional Economics and structuration theory in the evaluation of the effectiveness of planning implementation and pointed out that the government official's rationality in decision making has a decisive impact on the planning implementation; also, the property right in land is a critical factor in the effectiveness of planning implementation.

### **2.3 Research Question**

While most of the previous studies on TOD have focused on the outcomes of the physical environment in TOD, researchers have also found that the performance of TOD varies in different places. On the one hand, there have been well-recognized TOD examples, such as Copenhagen and Curitiba; at the same time, there also have been less effective cases, such as Bogotá. In other words, to make TOD planning happen on the ground calls for effective implementation mechanisms.

However, the studies on TOD implementation so far have been inadequate. First of all, the implementation studies in the overall planning field have been mostly focusing on the evaluation of the plan outcomes, as in most of the studies reviewed above. However, purely focusing on the output side provides a basis for conducting the evaluation but

tends to fail to portray the whole picture of planning implementation, which is a dynamic and interactive process. Especially in planning practice in reality, planning proposals often need to be reviewed and updated, not only during the formulation phase, but also in the implementation phase, allowing for planning adjustment and revision. Second, in terms of the implementation research on TOD, in general, there are not sufficient in-depth analyses in this area, especially in the Chinese context. Relatively comprehensive insights into TOD implementation processes are found in the American context (Cervero et al., 2004).

Evidence shows that Chinese professionals have learned and applied TOD in their planning practice in China since 2000, and there are a number of TOD efforts happening in China, with different scales ranging from regional visions to joint developments at transit station areas. However, we should also admit that successfully implemented TOD cases are still rarely found. Driven by practical needs, this research's objective is to study the barriers to TOD in China and provide guidance and suggestions regarding the planning and implementation process.

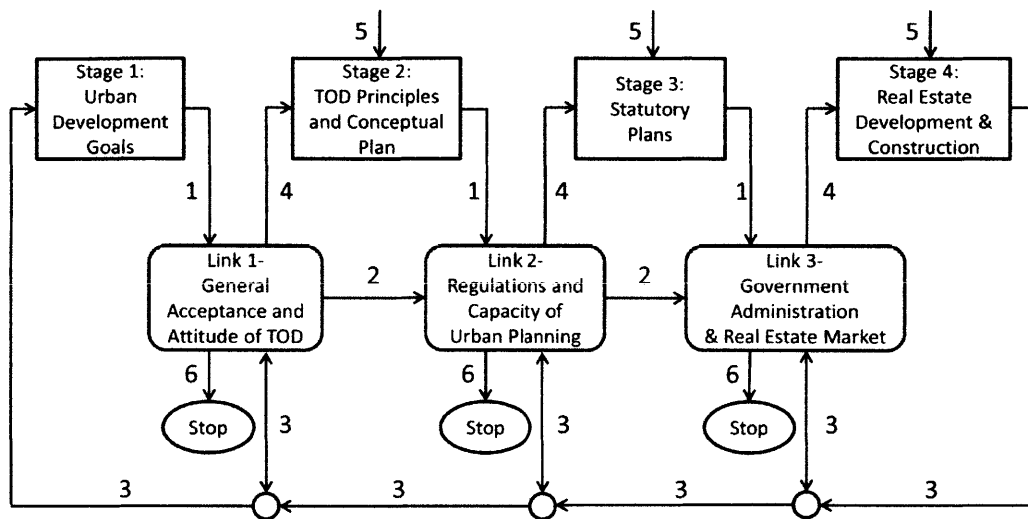
This research proposes the hypothesis that mass public transit, including subway, light rail, and bus rapid transit (BRT), cannot generate a satisfactory TOD outcome without the necessary regulation reform, institutional cooperation, and acceptance of TOD across different stakeholders. To test the hypothesis, this study seeks to answer two main research questions:

- Question 1: What are the barriers to TOD implementation in China? At which stage in the planning implementation process do the barriers exist? What are the key stakeholders that are coupled with these barriers?
- Question 2: Based on the first question, what are the solutions to the challenges in TOD implementation in China?

## **2.4 PPIP (Policy-Program-Implementation Process) Model in TOD Implementation**

This research seeks to fill this gap between the TOD planning and implementation through a quantitative analysis of several cities in China. In this research, the subject of implementing is TOD, a planning concept, which can be applied both in the planning implementation and plan implementation process. Rather than investigating the implementation of TOD plans, this research tries to look at the entire process of implementing TOD, as a planning idea, from the beginning of its knowledge dissemination to the end of the establishment on the ground.

In order to illustrate the implementation process of TOD in China, this study applies E. R. Alexander's PPIP model (E. Alexander & Faludi, 1989; E. R. Alexander, 1985) by assigning the specific stages of implementing TOD in the model, as shown in Figure 5.



**Figure 5.** Applied PPIP model of implementing TOD

The Stimulus stage in the PPIP model is represented as the urban development goals, which act as incentives for cities to adopt TOD. The second stage in the model is TOD principles and TOD conceptual plan. Between stages 1 and 2, the general acceptance and attitude towards TOD becomes Link 1. The third stage in the model is Statutory Plans, which adopt TOD through Link 2—regulations and capacity within the planning field. The fourth stage is real estate development and construction, which finally establish TOD on the ground, after going through Link 3—regulations and capacity both within and outside the planning field. The alternative paths to connect the stages and links are as follows:

- 1- from the preceding stage
- 2- from another earlier stage, without including the preceding stage
- 3- from any subsequent stage to any preceding stage ( feedback and evaluation)
- 4- to the following stage
- 5- to any other subsequent stage, without including the following stage

6- to premature completion of the process (Stop)

## **2.5 Research Methodology**

### **2.5.1 Semi-Structured Interviews**

In this research, the author conducted 41 semi-structured interviews. Most of the interviews, 37 out of 41, were conducted face to face between the author and the interviewees; the other 4 interviews were via Skype voice calls. The interviews typically lasted from 50 minutes to one hour. Each respondent was asked a series of questions designed to illuminate their perspectives on the concept, the planning, and the implementation issues of TOD. In the interview guidebook that was received by the interviewees, the questions were in three categories: the popularizing and acceptance of the concept, the planning and design practice, and the administration and implementation of TOD. All the questions were open-ended, and the respondents were free to express their opinions and knowledge.

All the interviewees were told before the interview that the study results would be used for academic research. With participants' permission, 40 of the total 41 interviews were recorded in audio for later transcribing and analysis. The entire interview design, guidebook design, interviewee recruitment, data collection, and analysis were approved by the MIT Committee on the Use of Humans as Experimental Subjects (COUHES).

### **2.5.2 Interviewee Recruitment**

In the composition of the interviewee pool, I sought to include different kinds of stakeholders in the planning and implementation process. Starting in January 2015, I

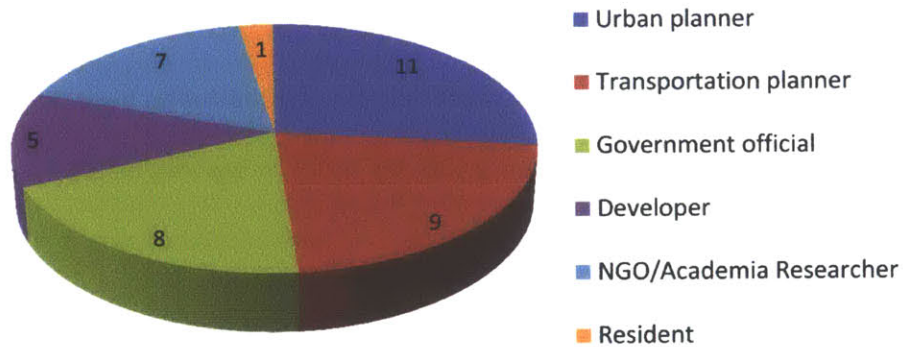
conducted in-depth interviews with 41 interviewees, who had different professional backgrounds and were from different cities. Regarding the interviewees' professional backgrounds, there were 11 urban planners, 9 transportation engineers, 8 government officials, 5 real estate developers, 7 researchers related to urban planning from NGOs and universities, and 1 resident who lacked a professional background in urban planning. The multiple professional fields provide this research with a broad scope that covers the entire process from TOD research, conceptual planning and statutory planning, to planning administration and real estate development.

In terms of the regional distribution of the interviewees, this research aimed to investigate the specific TOD planning projects' process, with the consideration of covering the leading cities in urban and transit development in mainland China. Thirty-six of the interviewees were from 7 different Chinese cities. Beijing, Jinan, and Kunming are the three major cities of the interviewees; the other 5 interviewees, who are urban planners or faculty members, were based in the United States.



**Table 1** Interviewee’s city and professional backgrounds

	Beijing	Jinan	Kunming	Shenzhen	Guangzhou	Shanghai	Qingdao	U.S.	Total
Urban planner	5	1	1	0	0	1	1	2	11
Transportation planner	4	1	1	2	1	0	0	0	9
Government official	0	5	3	0	0	0	0	0	8
Developer	1	2	2	0	0	0	0	0	5
NGO/Academic researcher	3	0	0	0	0	1	0	3	7
Residents	1	0	0	0	0	0	0	0	1
<b>Total</b>	<b>14</b>	<b>9</b>	<b>7</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>5</b>	<b>41</b>



**Figure 6.** Interviewee Composition

Jinan, Kunming, and Beijing are the three main case cities in this research. The main reason to have Jinan and Kunming as case cities in the research is because both of them have TOD planning projects in progress, namely, New East Station TOD Planning in Jinan and Chenggong TOD Planning in Kunming. All the interviewees in Jinan and Kunming have been involved in the TOD projects in their cities. Both Jinan and Kunming have BRT systems and Kunming also has a subway line in operation. Beijing is another major case city, because I have a strong professional network there and it is convenient

for me to contact the stakeholders in TOD planning and implementation. In addition, Beijing has the most extensive rail transit system in China, as well as 4 BRT lines.

Regarding the four other cities where the interviewees are from, Guangzhou, Shenzhen, and Shanghai have their mass rapid transit systems in operation. Guangzhou also has a successful BRT system, which is categorized as a Gold-standard BRT.<sup>6</sup> One interviewee is from Qingdao, which is the only city of an interviewee without a mass transit system in operation. However, one subway line in Qingdao is currently under construction and the interviewee has been involved in the TOD planning process associated with Qingdao's planned subway systems. The interviews were focused on people who have professional knowledge and experience in urban planning and/or urban transportation, so 40 interviewees have been engaged in TOD planning and implementation processes; one resident of Beijing was not in the urban planning or transportation field. Furthermore, most of them have a user's experience of the physical environment around the transit station areas in their cities.

### **2.5.3 Planning Document Review and Site Visit**

In addition to the interviews, the planning documents of the TOD Conceptual Plans in Jinan and Kunming have been reviewed.<sup>7</sup> Other related documents in the planning process, such as the regulatory plan documents and the meeting minutes from the

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<sup>6</sup> According to the BRT standard published by the Institute for Transportation & Development Policy (ITDP), Guangzhou BRT is a Gold-standard BRT.  
<https://www.itdp.org/library/standards-and-guides/the-bus-rapid-transit-standard/>

<sup>7</sup> Data sources: the Energy Foundation, Calthorpe Associates, Jinan Planning & Design Institute.

government agencies and developers have also been reviewed for the implementation analysis.

The author has participated in the TOD planning projects in Jinan and Kunming and also visually surveyed the developments near many transit stations in Jinan (BRT stations), Kunming, Guangzhou, Shenzhen, and Beijing.

## **2.6 TOD in the Chinese Context**

The first and most important element in TOD is transit. In the United States, automobiles had not been widely used in urban transportation until the 1920s. Before that, the public transit in American cities was mainly street cars, which accelerated the growth of cities. Take Boston as an example. From the 1850s to the early 1900s, the city expanded greatly from the old pedestrian city to the streetcar suburbs, which are 5 to 15 miles away from the city center (Warner Jr, 1962). Many small-block neighborhoods with pedestrian-friendly environments were established to accommodate the main transportation modes of streetcars and walking. Today, we still can find these traditional “TOD” neighborhoods (which were built before the concept of TOD was proposed), in some historical districts in Boston, Philadelphia, Savannah, etc. After the automobile became the dominant transportation mode in the U.S., the city forms changed to adapt to the prevalence of automobiles. At the same time, the development of transit systems in American cities has slowed down. In the U.S., one goal of TOD is to increase the transit ridership.

Compared to most American cities, Chinese cities have more favorable transit performance to leverage TOD. The rapid development of public transit systems in

Chinese cities in recent years is comparable to the expansion of streetcars in American cities in the second half of the 19<sup>th</sup> century. At present, some key indicators of public transit in Chinese cities are better than those of American cities, in terms of the total ridership, the coverage, the public attitude toward transit. In many Chinese cities, transit agencies worry more about overcrowded vehicles than insufficient passengers.

High density is another factor of which Chinese cities have a much higher degree to support TOD than that of cities in the U.S. TOD was originated to address the problem of low-density urban sprawl, and the original TOD density goals, established by Peter Calthorpe (Calthorpe, 1993) were: in TOD core commercial areas, offices with a minimum 0.35 Floor Area Ratio (FAR); in residential areas, densities within Urban TODs with a minimum average of 15 units per net acre. Any major Chinese cities already have much higher densities than the original density goals. It is worth mentioning that the TOD density indicators, which were developed by Calthorpe in his later publications and Chinese practice, have greatly increased. He defined the minimum density of the main TOD area as 200 employees per ha and 400 residents per ha (Calthorpe, Yang, & Zhang, 2013). In the Chenggong TOD Plan, formulated by Calthorpe, the FARs of residential blocks were between 2.7 to 4.0, and the FAR of commercial development ranged between 4.0 and 8.0. These density indicators have been generally adopted in Chenggong's regulatory plan, which has been developed by local planners. This shows that in the planning practice, planners both from the U.S. and China have already considered the context of high-density development in Chinese cities.

At the same time, although Chinese cities have higher density, it does not mean TOD is not applicable in China. In fact, the essence of the high density principle of TOD is aligning the high density development along the transit corridors; in other words, to achieve an optimized density distribution according to the transit accessibility. However, this is often absent in Chinese cities. A transportation planner pointed out in the interview that “...*the homogeneous development of a city is a problem, ..., the expansion of urban land is faster than the growth of urbanization, ...; if we could adopt TOD, we would be able to reduce the density of the areas without mass transit and match the high density with rail or BRT, achieving an intensive land use.*”

Facing the great challenge of motorization, policies to restrict or discourage the usage of automobiles are the third component to enable TOD. These regulations include the restriction of auto ownership by license control, congestion fee, parking management, increasing gasoline tax, and many other transportation demand management policies. Regarding the policies on car ownership restrictions, the first-tier cities in China have conducted more effective policies than the major American cities. By the end of 2014, four major cities—Beijing, Shanghai, Guangzhou, and Shenzhen—had all established policies of car ownership restriction. Despite the discussions on the equity implications and transparency concerns of these policies, they have effectively helped the cities to control the increase rate of car ownership (X. Chen & Zhao, 2013; J. Zhao, Chen, & Block-Schachter, 2014). Chinese cities have shown the willingness and capacity to implement policies of automobile restrictions. However, when we look at American cities,

it has been very difficult for them to implement any policies to regulate the use of automobiles.

The fourth component of realizing TOD is the pedestrian-oriented physical environment, which requires small blocks for extensive walking paths, ground-floor stores to create the active street life, and mixed land use to generate local destinations and improve job-housing balance. In the history of urban development, the forms of urban environment were all shaped for walking, no matter if in China, in the U.S., in Europe, or other places. However, the traditional pedestrian-oriented urban form has been changed to adapt to the automobile and the current real estate development pattern. The new districts in Chinese cities have been developed with superblocks from 400 meters to over 800 meters a side, compared to blocks in Paris, London, and Manhattan that average 120 meters a side. These superblocks have not only favored the use of the automobile, but also benefited big developers who can purchase the lease rights and develop these blocks in a more economically efficient way (World Bank & Development Research Center of the State Council, the People's Republic of China, 2014, p. 141).

In general, among the four critical components of realizing TOD, Chinese cities have already achieved two—the public transit system and the high density development. Although there are still a lot of shortcomings in transit service quality and huge room for improvement of the integration of high density and transit alignments, at least Chinese cities have a supportive foundation of these two elements. In addition, Chinese cities have shown the capacity of enacting policies of car ownership restrictions. It turns out that the most challenging part in implementing TOD is to create the pedestrian-oriented

environment. In fact, in Chinese cities, the automobile ownership is relatively low compared to cities in Western countries and the mode share of transit and non-motorized transportation still maintains a very high level. These transportation characteristics have become great advantages for implementing TOD. To break the superblock mentality and create a human-scale urban environment will have great positive impacts toward sustainable urban development.

## **Chapter 3 TOD Stakeholders and Their Structures—**

### **Link 1 in PPIP**

#### **3.1 Stakeholders in TOD Planning and Implementation**

In the planning and implementation of TOD, multiple stakeholders are involved in the process. From the perspectives of different stakeholders, this research tries to develop an understanding of their knowledge of TOD, and then to identify the barriers in the disseminating of the concept of TOD.

Clarkson(Clarkson, 1995) defines “stakeholders” as “persons or groups that have, or claim, ownership, rights, or interests in a corporation and its activities, past, present, or future.” Different levels of analysis—local, regional, national, and international—lead to different results as to whom to consider a stakeholder(Varvasovszky & Brugha, 2000).

In the present research, the focus of the TOD projects is the municipal level, where the main stakeholders are. National-level involvement will also be discussed, since national policies, such as planning regulations and codes, and the national ministries also have impact on the local planning process. The stakeholders are analyzed as different groups, rather from the individual perspective. In the context of planning and implementation, the main stakeholders are the researchers, urban planners, transportation planners (civil engineers), different government agencies, real estate developers, and the users—residents and employees—in the TOD areas.

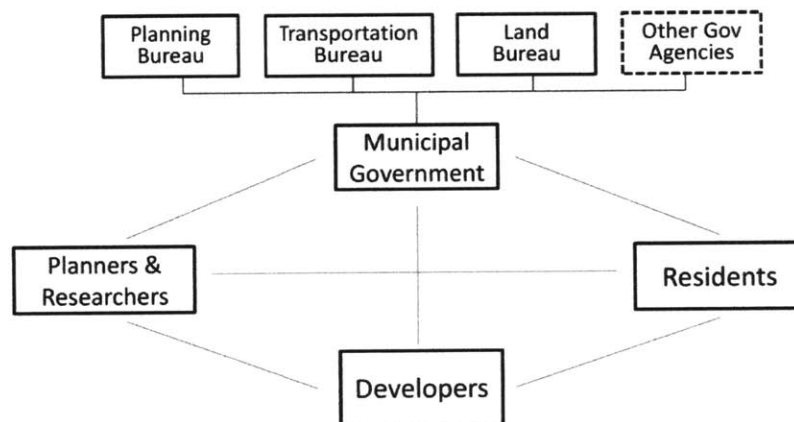


These different stakeholders play different roles in TOD planning and implementation. The government owns the land and is responsible for the statutory planning formulation, land granting, and regulating the development. The real estate developers are responsible for the detailed site plan, which should follow the requirements of the regulatory plan and permits of the government, and the construction of the commercial and residential developments. The researchers, urban planners, and transportation planners often act as consultants for the government and real estate developers to develop the planning proposals, in which the urban planners often play the leading role. The local residents and employees of the TOD area are the ultimate users.

Regarding the urban planners, it is arguable that they are tied to different clients, and hence their perspectives may vary from an urban planner who works for the developer to another who is affiliated with the government. In this research, the urban planner discussed is the latter—a planner who formulates the statutory plans for the government. Since TOD is a planning concept from the U.S., the perspective of an American urban planner will also be discussed through the interviews with Peter Calthorpe and a project manager from his team. They can provide both an insider's view, as they are participants in the projects in China, as well as the outsiders' view from the American planner's angle.

As for another important stakeholder, the government, there are different government departments involved in the planning implementation process. At the municipal level, the three main government agencies associated with TOD are the planning bureau, transportation bureau, and land bureau. S. Chen et al. (S. Chen, Yin, & Ye, 2008) framed the planning and implementation into three: planning approval phase, implementation

administration phase, and development construction phase. All the three departments are involved and interconnected in these phases. In addition to the planning, transportation, and land bureaus, many other government agencies are also involved in TOD implementation. The Traffic Management bureau, which is subordinated to the Public Security Bureau, is in charge of the traffic signal control, right of way allocation, traffic flow regulation, and other traffic management issues related to TOD. The Development and Reform Commission is responsible for the approval of large infrastructure investment projects, such as the construction of rail transit and BRT systems. The Construction Commission, the Bureau of Landscape and Forestry, the Firefighting Department, and the Bus Company are also involved in TOD planning and implementation process.



**Figure 7.** Main stakeholders in TOD implementation at the municipal level

### 3.2 The Understanding of TOD

When people claim that they know about TOD, they may have different interpretations, or misunderstandings, of TOD. The most frequent misunderstanding by many Chinese

professionals about TOD is *Transportation-oriented Development* rather than *Transit-oriented Development*. A staff member from the urban planning bureau of one municipality in our case cities stated that, in the early 2000s, there was a planning proposal of this city that applied “TOD”: two major arterial roads would act as development backbones of a new district of the city. At that time, local planners thought that was TOD—*Transportation-oriented Development*. Obviously, the arterial roads in the new district will lead to automobile-oriented development, which is totally contradictory with *Transit-oriented Development*.

Even recently, many people still interpret TOD as *Transportation-oriented development*. A professor from a university in Shanghai mentioned in the interview: *“I often ask students the question ‘what is TOD?’ in my class, and I get different answers. Some students believe that the expressway can leverage TOD and do not understand that the T in TOD is “transit.” Where do these misunderstanding come from? The students learned from some other teachers who did not understand clearly.”* In the academic journals, we can still find, in some papers, that TOD was translated as “Transportation-oriented Development.” In the academic environment, where the TOD concept was introduced very early, we still have these misunderstandings. It is not surprising that other kinds of stakeholders would have even more limited knowledge of TOD.

In addition to the misunderstanding, there are also incomplete understandings. People easily match development, the D in TOD, with high-density development. However, when it comes to other critical features of TOD, such as pedestrian-oriented design and mixed land use, people tend not to link these to TOD. One urban planner from Shanghai

pointed out in the interview: *“It is not a big issue for people [the clients—government or develop] to understand and accept high-density development. They can easily apply it, but they still have trouble adopting pedestrian-oriented development.”* A government official from Kunming mentioned that: *“I think people’s understandings of TOD generally remain at the basic idea level. The knowledge about some specific planning techniques of TOD is not at the same level among different people. For example, high density around the transit stations and prioritizing public transit are well recognized; but as for the increasing the road density, the green way, they are not very popular.”*

Misunderstanding and incomplete understanding prevent people from fully adopting the idea of TOD. The reasons why people have these misunderstanding or incomplete understanding of TOD are four-fold. First, the misunderstanding and incomplete interpretations of TOD often result from the theory-seeking activities. In many cases, TOD is applied in a passive way. For example, when a city is facing traffic congestion or seeking to justify the development of a new district, the professionals often look for a planning theory of transportation or development as a theoretical foundation, or sometimes as a gimmick. In this circumstance, TOD tends to be selected as a solution but interpreted incorrectly. Second, the high-density feature in TOD meets the short-term financial goals in the real estate market as well as the land granting process of the government; while the other features, especially pedestrian-oriented development, are often related to social benefit and less related to short-term economic goals. As a result, high density wins acceptance by both developers and local governments. Third, in the translation from English to Chinese, the “T” is easily interpreted as “transportation”

rather than “transit,” as the former appears to be a more basic English word than the latter for Chinese speakers. Many interviewees from multiple case cities mentioned similar situations of considering TOD to be *Transportation-oriented Development* when they first heard about TOD.

### **3.3 The Information Structure of TOD Implementation**

When a city is facing the problems of rapid urban growth and motorization and seeking solutions for its sustainable urban development goals, TOD becomes one option for addressing the problems. For implementing TOD, the first step is to have the stakeholders understand and accept the concept of TOD, and this becomes Link 1 in the PPIP model (Figure 5) which connects the cities’ development goals and adopting TOD in the planning process.

It has been more than 20 years since Peter Calthorpe first defined the concept of TOD in 1993. Papers talking about TOD can be found in Chinese academic journals in the late 1990s, and planning proposals in different cities in China have been citing TOD as their main principle. However, the interview results in this research reveal that the popularizing of TOD in China varies across different stakeholders. While the researchers learned about TOD in the mid-1990s, the developers seem to be a group of people who learned about TOD only in very recent years.

It is not surprising that the researchers from NGOs or universities are the group who first learned about TOD. A researcher from an NGO said: “*It was in 1995 or 1996, I introduced the Curitiba TOD case in a report of the World Bank in China.....*” Planners

and transportation engineers also have learned about TOD since the 1990s. A transportation planner from Shenzhen reported that *“The first time I learned about the TOD concept was around 1995; and I also remember that the Ministry of Housing and Urban-Rural Development organized a training program in 1995 or 1996 and introduced TOD.”*

In contrast, many real estate developers tend not to have heard about TOD until the planners proposed it or the government asked them to apply TOD. One developer from Jinan said: *“This project (a residential development in Jinan New East Station area) is the first project in which I learned about TOD.”* Another developer from Kunming also admitted that: *“I had never heard of TOD before I came to join this project (a year after 2010). Even now, I can only roughly get the idea of TOD when I read the planning proposal.”*

Regarding the officials and staffs in government agencies, their knowledge of TOD largely depends on their education background and the department they are affiliated to. Some government officials from Kunming and Jinan, whose educational backgrounds were not urban planning-related majors and who were not working for the urban planning agencies, reported in the interviews that they had not learned about TOD until they got involved in the TOD projects very recently. In contrast, other interviewees, who majored in urban planning or transportation, mentioned that they learned about TOD for the first time when they were in college around or after the year 2000.

The knowledge dissemination in municipal government also shows a regional difference. Interviewees from Beijing, Shanghai, and Shenzhen, which are three first-tier cities in

China, reported a better understanding of TOD by the government staff than those from Jinan and Kunming. A transportation planner from Shenzhen reported that *“There’s totally no problem for the professional and the government officials in Shenzhen to accept TOD.”* Similarly, an urban planner from Shanghai also mentioned: *“Now the mayors all pay attention to TOD, and the municipalities [have] often asked us to study TOD.”* In contrast, a transportation planner from Kunming pointed out: *“I think there is still a ‘literacy’ issue about TOD—even some technical staff in the planning bureau do not fully understand TOD.”*

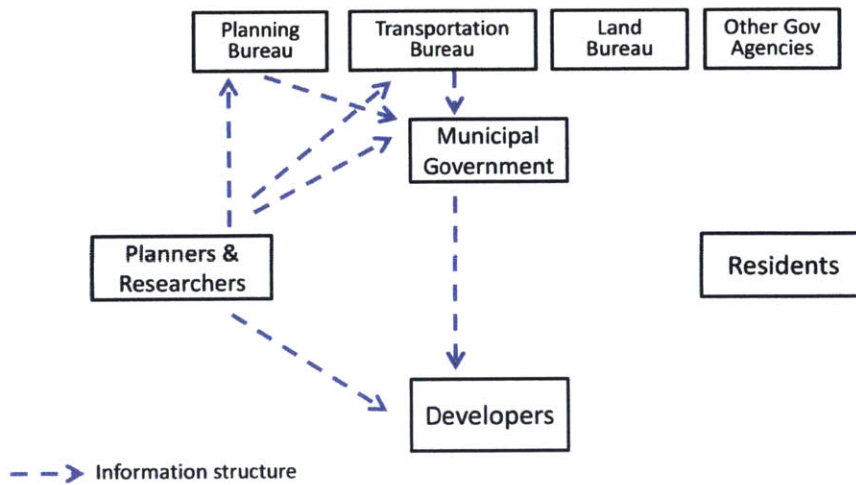
However, the residents’ understanding of TOD is even more limited. An interviewee, who is from Beijing, reported that she had never heard of the concept of TOD. It’s not fair to expect the general public without professional training to know this professional term; however, the inherent features of TOD neighborhoods, such as walkability and variety, still seem not very effective in the housing market to attract the residents. One developer from Jinan pointed out that: *“It is not effective to explain to our clients [housing buyers] how TOD could improve their living environment. They do not understand or care about TOD. For example, it would be easier for us to market a European-style façade than a TOD neighborhood.”*

Generally, the knowledge of TOD in China still basically remains in the academic or professional domains, and is not widely disseminated in practical urban development. The developers, who play a more active role in TOD implementation than the researchers or urban planners do, tend not to know about TOD until the planners propose the concept to them. The information flow started from the researchers and urban planners, who

learned TOD at an early stage. By introducing TOD in academic papers and adopting TOD in the planning consulting deliverables, TOD has been spread to their readers and clients—government officials and developers, who are two main stakeholders in implementing TOD. Once the government accepts TOD, this concept, at least part of it, will be incorporated into government policies, in the manner of government-dominated urban plans. Developers have received the knowledge of TOD either from the planning proposals that come from the planners who work for the developer, or from the government’s policies and plans.

Regarding the different agencies subordinate to the municipal government, the planning bureau and transportation bureau are the most likely to be influenced by the researcher and planners about TOD. At the same time, the planning bureau also often plays the role of reporting on TOD to the municipal leaders. Other government agencies, including the land bureau and traffic management bureau tend to be less likely to get exposed to TOD. The residents, who are the ultimate users of TOD, unfortunately have very limited knowledge of the term “TOD.”





**Figure 8.** Information Flow in Implementing TOD

### 3.4 The Incentive Structures in TOD Implementation

Planners and researchers are incentivized to study and apply TOD, driven by their professional ethics. They believe that TOD could help to reduce people’s average commuting time, achieve job-housing balance, and create an active street life and pedestrian-friendly environment. In some circumstances, TOD becomes an effective selling point or even a gimmick for planners to communicate about with their clients, the government, or developers.

Municipalities’ incentives to adopt TOD are more comprehensive, including transportation benefit, economic benefit, and social benefit. First, they value the transportation benefit and hope TOD could help them address the problems in urban growth, such as to reduce congestion. However, the incentives of transportation and social benefits mostly concern staff in technical departments in the government, such as

the planning bureau and transportation bureau. The rest of the government officials care more about the economic benefit of implementing TOD, seeking to increase the land value. One main responsibility of the municipalities is to maintain a sustainable revenue income. Revenue from land leasing is more obvious and direct than transportation, which may generate very limited revenue. As a planner mentioned in the interview, *“When the government negotiates with the developers, the land around a rail transit station can be granted at a higher price and increase the government’s revenue income.”* A director from the government pointed out in the interview that, *“For those government officials at a certain level, they have limited chances to travel by walking, so it’s natural for them to first look at the land value, economic benefit, and traffic congestion; then they may care about the social benefit and the improvement of the urban environment.”*

For real estate developers who accept TOD, their incentives to adopt TOD are stimulated by the economic benefits. They accept TOD only when they find the value capitalization created by the high-density development and the commercial value that is associated with the frontage of small blocks. In an interview, a developer from Chenggong acknowledged that: *“The most important thing about TOD for us, as developers, is the increased land value. The small blocks have a higher commercial value as there is more frontage space on the street than with the traditional big blocks; hence, the land value [of small blocks] is higher.”* The Rail Transit companies, which are state-owned enterprises in most cities, are also incentivized by the economic benefit to adopt TOD for the multi-level development above the rail depots. Constrained by land-granting regulations, rail transit companies often find it hard to acquire the adjacent land around the normal stations;

however, they try to develop the rail depots into the multi-level and mixed use complexes in order to maximize the land value and generate profit.

Developers' incentive to adopt TOD is mainly confined to commercial development, which is supported by the increased block frontage of the small blocks and mixed use. In terms of the residential development in TOD, developers are much less incentivized, because the small-block and non-gated community is contrary to the super-block and gated community residential development, which is widely accepted by the real estate housing market. The small-block residential development requires a higher upfront cost, because the underground parking needs more entrances and exits when it is divided into small spaces by the small blocks. The cost of security in a small-block neighborhood is also higher than for super-blocks, as more security guards and facilities are needed. Most developers are not willing to take the risk to change their type of residential product—super-block residential development.

For residents, we can hardly tell if they have the obvious incentives to accept TOD, which seems to be too professional and academic for them. At the same time, public participation in urban planning is still not widely established, and residents are often not included in the decision making process in urban planning. Nonetheless, if it is a choice between the TOD-type residential neighborhood—small blocks—and the traditional super-block residential neighborhood, the latter one tends to be more favored by the housing buyers.

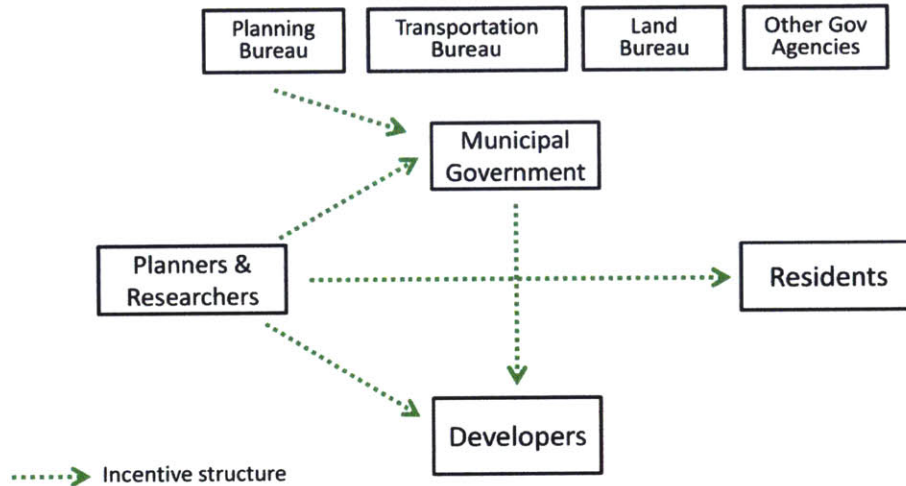
The dense road network and small blocks of TOD can create the extensive pedestrian pathways of a walking-friendly environment, but this small-block pattern has not been

accepted by most of the consumers in the real estate market. It's not because the residents do not value the pedestrian environment, but because of their security concerns about a non-gated community. In the interviews, many interviewee (including residents, urban planners, and researchers) reported they lived in the super-block neighborhoods and appreciated the security and interior environment of the super-blocks. One researcher from an NGO in Beijing explained in an interview why people like to live in gated communities: *"Because in Chinese cities, the general urban environment is not as good as in many cities in Western countries, people prefer to have a gated community environment which has good landscape design and security. Personally, I live in a gated community and I like the environment from my own standpoint, but from the transportation perspective, it is not overall optimized."* A resident from Beijing explained in the interview: *"Whether the community should be gated or not depends on the general condition of the city environment. If I live in a community which has a good internal environment, but the adjacent community doesn't, I certainly do not want my community to be open to the other communities, because the strangers might mess up my community and lead to security concerns."*

An urban planner from Shanghai maintained similar opinions: *"Residents want to walk across the other residential districts just for shortcuts; however, regarding their own community, they hope it is gated with good security and a nice internal landscape—and other people don't have access. It's like the concept of NIMBY—Not In My Back Yard."*

In general, the urban planners and researchers have the strongest incentive to promote TOD. The municipal government agencies are incentivized to adopt TOD to address the

transportation problems and increase the land value. Developers, who are profit-driven, are motivated by the land value increase by high density and ground floor commercial development. The residents, unfortunately, haven't been convinced by the small-block communities of TOD.



**Figure 9.** Incentive Structure in Implementing TOD

### **3.5 The Power Structure in TOD Implementation**

The municipal government and its different departments have the administrative power over the developers and planners, as well as the entire planning formulation and implementation process. In the Chinese context, urban planning is mostly implemented in a top-down approach and the government often takes the leading role in planning implementation. The statutory plan--including the master plan and regulatory plan--and conceptual plan of TOD are both dominated by the government.

In a typical planning formulation process, the government hires the planning consulting firms to deliver the planning proposals. In this process, planning workshops are organized by the government and main government agencies attend the workshops to give their feedback to the planners to revise the draft proposal. At the final stage in the planning formulation, the government needs to organize an expert panel meeting to evaluate and comment on the final planning proposal. In this way, the opinions of the government agencies and the experts are incorporated in the final planning proposal, which needs to be approved by the municipal government.

In the three levels of the statutory urban planning in China--city master plan, regulatory plan, and site plan--developers can only participate in the site plan, which is required to follow the approved regulatory plan. Theoretically, once the upper-level regulatory plan has been approved, the following site plan needs to follow the entire requirement in it, such as the FAR, building coverage, etc. However, there is still plenty of room for the developers to give feedback during the site plan formulation and have the regulatory plan to be adjusted. In reality, the regulatory plan often stays un-approved to leave room for adjustments until the detailed site plan is confirmed. In this way, statutory planning can obtain the opportunity to incorporate feedback from the market and other stakeholders; in the meantime, it leaves room for developers to negotiate with the government.

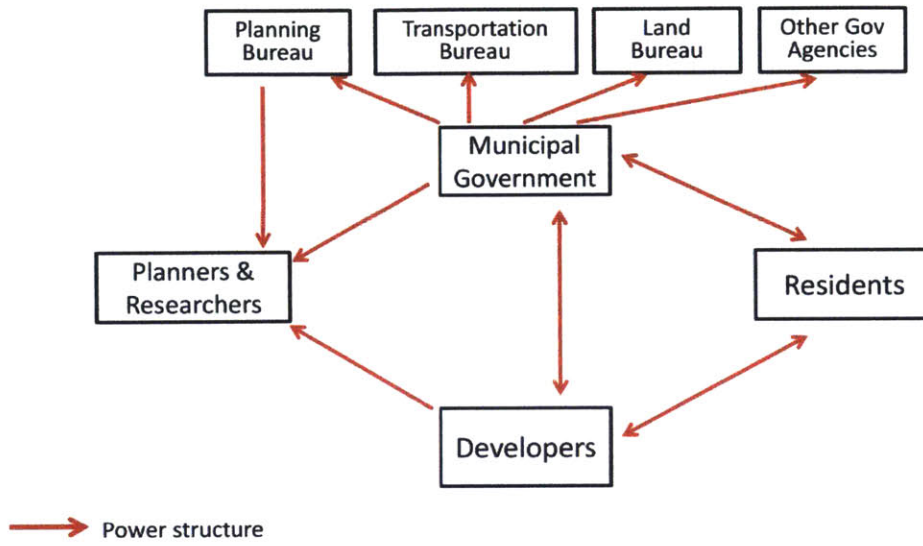
Developers have a very strong market power over the government, especially in the less developed second- and third-tier cities, where the governments make every effort to attract the investments of the developers. In the more developed cities, like Beijing and Shanghai, the municipal governments worry less about attracting developers and even

have the choice whether to let developers in by enforcing certain regulations. However, in the smaller and less developed cities, it is often the big developers who hold the initiative to invest or not. A government official from Jinan admitted in the interview: *“The government often plays a passive role in urban development. In order to attract investment, the government usually has to compromise and make concessions in urban planning.”*

In an interview with an urban planner from Shanghai, he even quoted the advertising slogan of Wanda, which is one of the biggest developers in China: *“Wanda Plaza Defines the City Center.”* He interpreted the slogan banteringly: *“This shows the power of the market: it doesn’t matter where the city center is in urban planning, but where Wanda Plaza is located, which tends to be the city center.”*

Urban planners and researchers have been trying to promote TOD in China; however, they don’t have very much power in implementing TOD. Developers and government both have employment power over the planners, who work as consultants for them. As we describe above, in the planning formulation, urban planners have to incorporate their clients’—government and developers— comments in the planning proposals.

In the process of TOD planning and implementation, local residents have a limited power over the government and developers through social and market impacts. Although the government and developers have to consider the needs of the residents in urban planning, the residents’ opinions are often not directly assimilated in planning because an effective public participation mechanism is absent in planning implementation.

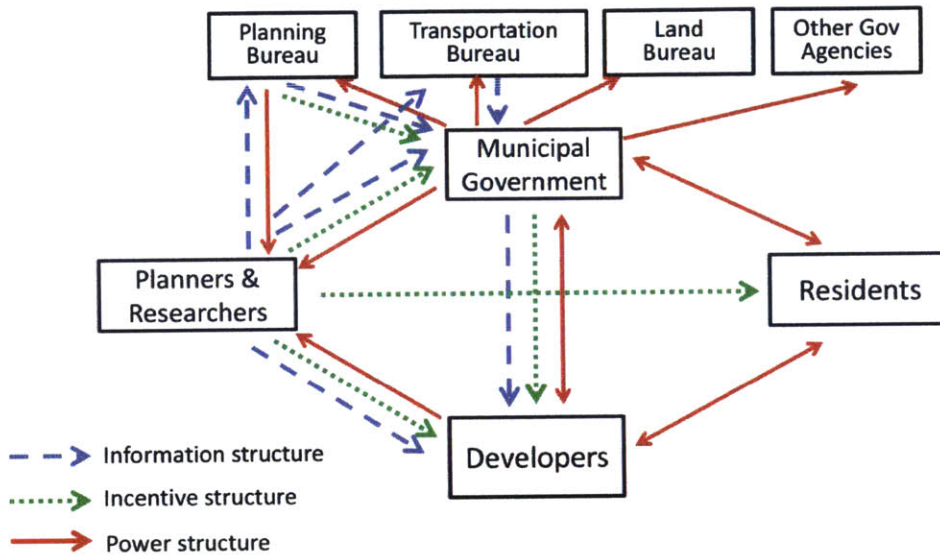


**Figure 10.** Power Structure in Implementing TOD



### 3.6 The Integrated Structure of Stakeholders in TOD

#### Implementation at Present



**Figure 11.** Integrated structure of stakeholders in TOD implementation

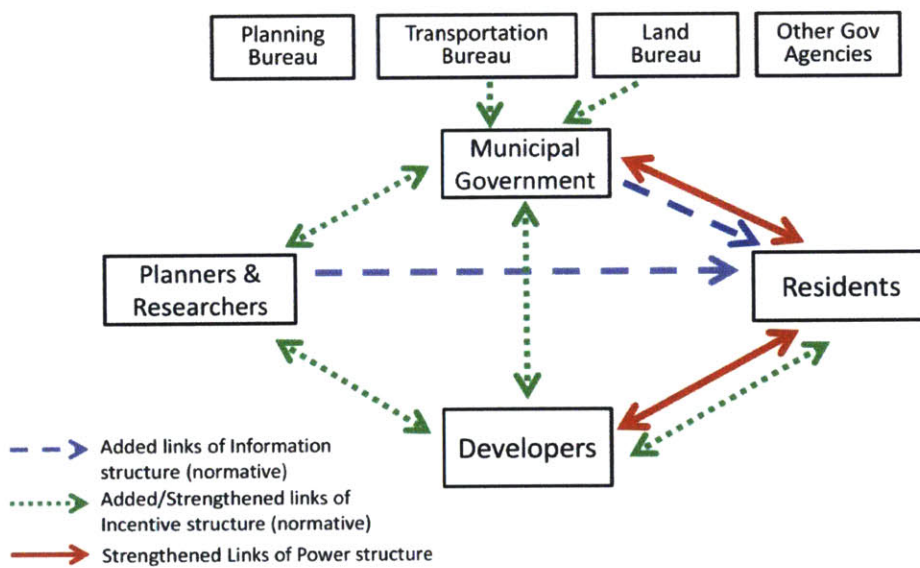
In the integrated structure of the stakeholders in TOD implementation, as shown in Figure 11, we can find strong information and incentive connections from the planners and researchers to other stakeholders. However, the power structure shows the counter-direction impacts, which come from the government and developers to planners and researchers. While the government holds the administrative power over the other stakeholders, developers carry the market power to manipulate the TOD implementation. Urban planners and residents' powers are very limited in the current structure.

These integrated structural relationships reveal that, compared to other stakeholders, urban planners and researchers care most about TOD. Unfortunately, the more powerful

stakeholders, government and developers, care less or only care about part of the concept of TOD. The residents, who are the ultimate users of TOD, are not informed and incentivized well enough to be engaged in TOD implementation. Although residents hold some power to influence the developers through the market and the government agencies through planning participatory process, but this power is still too weak in TOD planning and implementation.

### 3.7 The Normative Integrated Structure of Stakeholders in TOD

#### Implementation



**Figure 12.** Links need to be added or strengthened in the integrated stakeholder structure

To better engage the stakeholders positively in TOD implementation, several key connections are identified to be added or strengthened, as shown in Figure 12.

- **The information structure**

In the information structure, there are two links that need to be added: one is from the government to the residents; the other is from planners and researchers to residents. At present, the resident is the least informed stakeholder of TOD. If the government and planners and researchers could inform the residents about the benefits of TOD, such as the convenience to live in TOD neighborhoods, residents would be more likely to understand and accept TOD.

- **The incentive structure**

The developers need to be more incentivized to provide TOD products under the market mechanism. Currently, developers are mainly following the statutory planning, which is formulated by the planners and enforced by the government, under the government administrative mechanism, but not too much driven by the market, except for choosing high density of TOD. From the market perspective, developers are not incentivized to follow TOD especially for residential development, as they often claim that the small-block and non-gated community is not widely accepted by the housing buyers. Once the developers could identify changed market demand, they would have more incentives for TOD. The suggested improvements of informing residents in the information structure will support the incentive structure by fostering the acceptance of TOD in the real estate market.

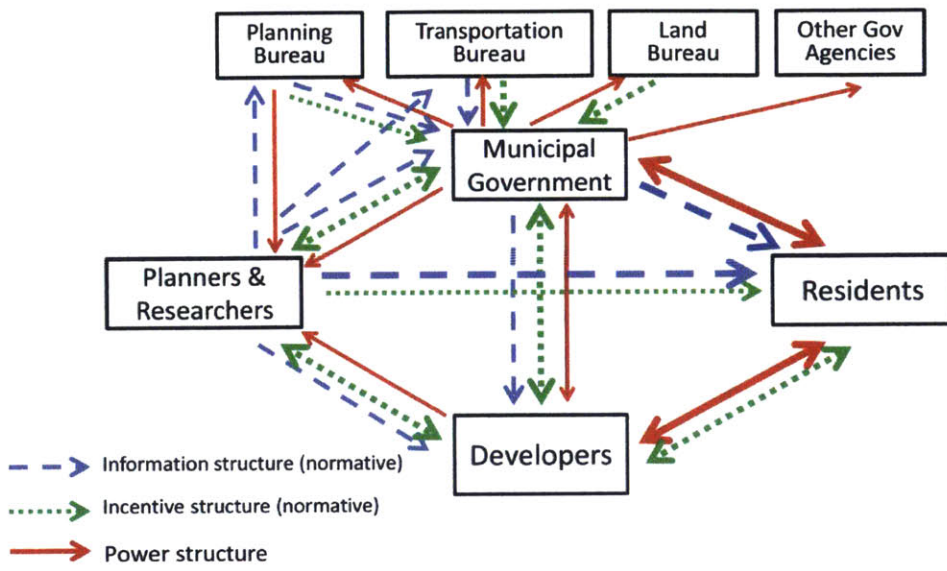
Regarding the government in the incentive structure, the transportation bureau and the land bureau are the two critical departments that should be motivated to promote TOD

more actively. At present, TOD is still mainly led by the planning bureau and other agencies have not fully adopted TOD. However, successful TOD requires multiple government agencies' coordination.

In addition, the incentive relationships between the planners and the government, as well as between the planners and developers, need to be improved to become two-direction impacts—in contrast to the current mere one direction from the planners and researchers to the other two stakeholders.

- **The power structure**

The power structure is difficult to modify significantly because it is associated with the fundamental administrative or market relationships between stakeholders. However, certain power relationships between them could be reinforced when the changes in information and incentive structures happen: the power from the residents to the government and developers can be strengthened through informing the residents about the benefits of TOD and letting them become more involved in the TOD planning process.



**Figure 13.** Normative integrated structure of the stakeholders in TOD implementation

## **Chapter 4 A New Paradigm of Planning and Design –**

### **Link 2 in the PPIP**

In the interview, Peter Calthorpe pointed out that: *“The first challenge is to get the professionals-- the planners--to accept TOD and to let them know how to do it easily. TOD is a planning methodology which is not taught in school. Professionals don’t know how to do it easily. It’s second nature to planners to lay out super blocks. It’s second nature for transportation planners to figure out how many lanes on every boulevard every 400 meters. Learning how to do a new type of urban design is a threshold.”*

TOD is a new paradigm of planning and design for the urban planners and designers in China. Most of the urban planners in China are trained under the traditional urban planning and design system, which retains characteristics of the planned economy. Many planning regulations and codes are developed from an engineering point of view, and lack consideration of human scale, urban space, and the land market.

Zhao (Y. Zhao, 2002) pointed out that, under the planned economy, the land of roads and the land of development parcels are two types of land supply. The only goal of roads is to meet the transportation function, without considering the adjacent land value, and this leads to the “super block and wide street” planning methodology, which is influenced by the former Soviet Union.

The conflicts between TOD and the planning codes/regulations are becoming barriers to TOD planning. Two main conflicts have been reported by urban planners in the

interviews—the layout of the road network and the setback. An urban planner who participated in the regulatory plan of Chenggong TOD in Kunming reported: “*The conflicts are huge. There are two main problems: one is the conflicts with the transportation road networks planning codes, which are basically automobile-oriented... Another major conflict is the issue of setbacks. The current planning regulations require larger setbacks than TOD requires.*” Another urban planner from Jinan, who participated in the conceptual plan and regulatory plan of the East Station TOD, also expressed similar opinions of the conflicts between TOD principles and transportation planning codes and setback regulations: “*According to Jinan planning regulations, the road network needs to be laid out in a hierarchy—arterial road, secondary road, and local road—but in Peter’s TOD planning, the small road network is homogenized. Another issue is the setback. The setback in Peter’s TOD plan is much smaller than the requirement for setbacks in Jinan’s local planning regulations.*”

#### **4.1 Dense Road Network and Small Blocks**

The traditional transportation planning methodology lays out the road network in different levels and defines the road network density. According to the Code for Transport Planning of Urban Roads (GB 50220-95)<sup>8</sup>, the configuration of an urban road network should “*adapt to the expansion of urban land, and in favor of the development of motorization and rapid transport.*” This code also provides the road network density indicators for different cities of different populations: for example, in cities with over 2 million people, the road network density should be 5.4-7.1 km/km<sup>2</sup>. In addition, this code

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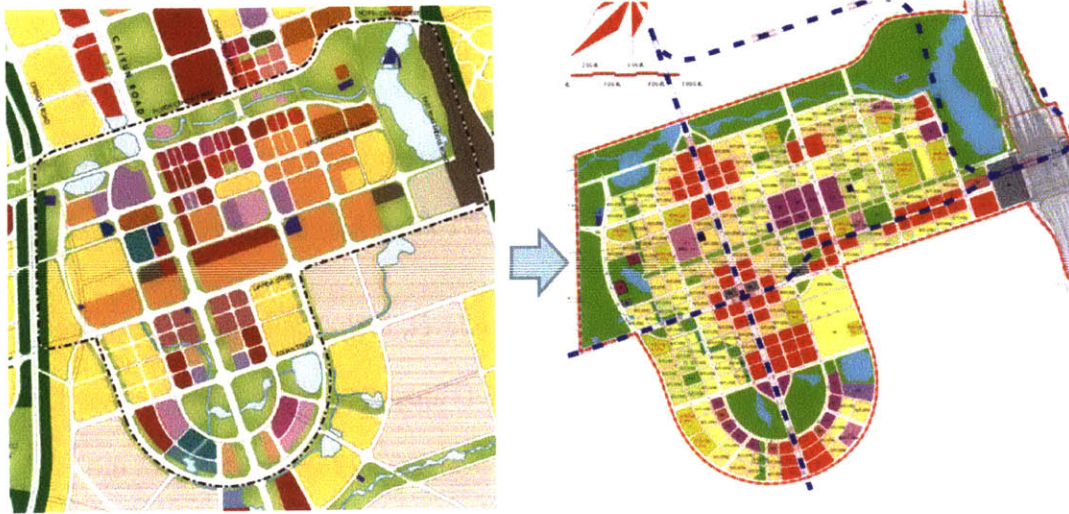
<sup>8</sup> Chinese national planning code issued by Ministry of Construction of China in 1995.

specifies that, in areas where the FAR is higher than 4, the road network density could be doubled, i.e., 10.8-14.2 km/km<sup>2</sup>. However, the code does not clearly define the FAR's base area: is it a single block or an entire city center area? It seems the entire city center area would make more sense for a calculation of the road network density. However, for this scale of city center area, its FAR is very hard to make higher than 4. As a result, this code retains some grey areas for interpretation and at the same time, shows a clear automobile-oriented perspective, which strongly encourages urban planners to maintain the “super block” planning paradigm.

In Peter Calthorpe's conceptual TOD plans in China, the “narrow roads and small blocks” planning idea has replaced the traditional “super block” paradigm. The small-block road network seeks to invite walking and biking by providing more direct routes between the origins and destinations and a smaller spacing between pedestrian-crossings.

Comparing the road configuration before the TOD plan and that in the TOD plan (shown below), we can see that the road density increases significantly—from 6.5 km/km<sup>2</sup> in the original plan (left) to 13.7/km<sup>2</sup> in the TOD plan (right), which is much higher than the recommended density of the general area in the planning code, and almost reaches the highest level of the density of the area with an FAR higher than 4.





**Figure 14.** Road configuration and land use before and after the TOD plan  
 (Source: Chenggong Low Carbon City, Calthorpe Associates and the Energy Foundation)

## 4.2 Setbacks

In TOD planning, building setbacks from public streets should be minimized, and setbacks should reflect the desired character of the area, bringing buildings close to the sidewalk (Calthorpe, 1993). The setback requirements are not included in any national planning codes but in many local regulations in China. Generally, the setback regulations require much larger distances than the recommended setbacks in TOD planning. For example, in the Jinan New East Station TOD Plan, the setback for commercial blocks is recommended as 0 to 3 meters and the setback for residential is 3 to 5 meters. However, according to the Jinan Urban & Rural Planning Administration Technical Code, the setbacks should be much larger: minimum 15 meters for the main arterial roads, 8 meters for secondary arterial roads, 5 meters for local roads, and 8 meters for overpasses. In Beijing and Kunming's local planning regulations, there are also detailed requirements for setbacks, which are generally larger than what TOD planning would encourage. In the

interview, responding to the conflicts with the planning code or regulations, Peter Calthorpe stated: *“The biggest issue is that the setback requirements have to change. On super blocks, you can afford to do setbacks, while it doesn’t really help the streetscapes, but you can do that; whereas for small blocks, you cannot have the setback requirements.”*

Because the setbacks are only regulated at the city level, in the planning process, the locality can avoid the conflicts by defining the TOD area as a special area in a new local regulation, as long as the local government accepts and would apply TOD. An urban planner from Kunming declared that *“we normally bypass the conflicts between TOD principles and local planning regulations by defining the TOD area as a special area.”* A former planning bureau official from Kunming explained how Chenggong TOD planning dealt with the regulation conflicts: *“Although the planning regulations should be applied universally, we defined some special areas, such as city center area, historical area, ecological area, and within these special areas, the final approved regulatory plan would be the guidance for implementation, not necessarily complying with the planning regulation. This provides the legitimacy for Chenggong to adopt TOD principles, such as small setbacks and small intersections...”*

### **4.3 Building Spacing Requirements**

Building spacing requirements are another type of major barrier to TOD planning. There are two types of spacing requirements in the planning code. One is building separation requirements, which are applied to the east-to-west spacing between residential buildings and the separations of all sides for other non-residential buildings. The purpose of building separations is basically for meeting the requirements of ventilation, avoiding

visual interference, and fire protection. Another is solar spacing: the north-south spacing between residential buildings must satisfy the sanitation requirement that each housing unit is receiving enough sunshine during the winter.

Building separation and solar spacing requirements have different influences on TOD planning. In the interview, Peter Calthorpe pointed out the conflicts of building separation with TOD: *“The building separation is distinctive from the solar spacing. The building separation spacing regulates the distance from east façade to west façade as opposed to north façade to south façade. The space requirement does too much.”* In TOD planning, the continuity of the building façade along the street is a key factor to create a human-scale street space, but the building separation requirements can make the façade continuity hard to achieve.

In terms of solar spacing, Peter Calthorpe argued that it does not have conflicts with TOD small blocks: *“I accept solar spacing entirely. We’ve demonstrated that small blocks can work with solar spacing. But what it means is you get varied height of buildings. The buildings on the north side of the streets have to be shorter than those on the south side.”*

One developer from Chenggong, Kunming, supported Peter Calthorpe’s opinion by reporting that there were no conflicts between their residential district plan, in which TOD principles were applied, and the solar spacing requirement in Kunming.

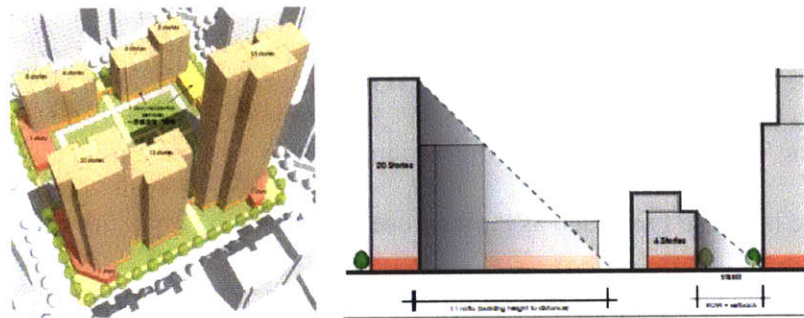
However, some other interviewees argued that the solar spacing requirement indeed has conflicts with TOD planning. An urban planner from Jinan said that: *“If we applied TOD principles in a residential district plan, there would be a lot of buildings that cannot meet the solar spacing requirements.”* Then the question is, why do people have different

opinions on whether solar spacing is conflicting with TOD? One reason is that specific solar spacing varies among different regions of different climate zones, where the angles of solar incidence would be different, according to the Code of Urban Residential Areas Planning & Design. Generally, cities in northern areas have larger spacing requirements than cities in southern areas. Hence, residential buildings in Jinan, which is in north China, need larger distances from south to north than those in Kunming, located in southwest China. Another reason is that, to meet the same solar spacing requirements, high-rise buildings will have larger spacing than low-rise buildings. When planners want to achieve high density development by arranging for high-rise residential buildings, the small blocks needed in TOD planning often cannot accommodate two parallel high-rise buildings. Furthermore, large spacing between buildings also challenges the design of human-scale streets: How to deal with the space between the roads and buildings?

One solution to fit high-rise buildings into small blocks but also meet the solar spacing requirement in Calthorpe's planning proposal is to have variations in building heights—to put the high-rise building on the south side in a block and the mid- to low-rise building on the north side, as shown in Figure 15. In this way, small blocks can take advantage of the required solar spacing of the high-rise buildings to create a relatively large courtyard; at the same time, the solar spacing of the shorter mid/low-rise buildings can fit the scale of the road to the north of the block (Figure 15-b).



a. Residential block with an FAR of 1.0-2.0, mid- to low-rise buildings



b. Residential block with an FAR of 3.0, mid- and high-rise buildings

**Figure 15.** Residential block types in TOD Plan  
 (Source: Calthorpe Associates and the Energy Foundation, *Jinan New East Station TOD Conceptual Plan* and *Chengong Low Carbon City*, 2013 and 2011)

However, the variation of the residential building heights encountered great resistance in the implementation in Jinan. In an interview, a local urban planner from Jinan reported that in a detailed plan of a residential district for relocated villagers in Jinan New East Station area, the residents, the developer, and the government officials all do not accept the height variations for one reason: it creates equity issues when allocating the housing units to the relocated villagers. *“Everybody wants to live in the lower-rise buildings, which represent a higher housing quality than high-rise buildings.”*

In order to meet different stakeholders' demands, the local planners revised the planning proposal from a pair of 33-floor and 11-floor buildings in one block to a pair of 27-floor and 24-floor buildings. The building heights variation was reduced but the distance from buildings to roads increased due to the change from 11-floor to 24-floor. As a result, the setbacks were enlarged and planners added a green belt in the setback to utilize the space; however, the human-scale street space in the original TOD conceptual plan was not achieved.

#### **4.4 Mixed Land Use**

Mixed land use is a fundamental principle in TOD planning and has been highly promoted in the TOD plans. In China, the national land use classification code<sup>9</sup> does not have a specific land use type such as “mixed use.” However, many cities have formulated their own land use classification rules. For example, in the Regulatory Planning Formulation Rule in Beijing, three types of mixed land use are included in the classification, which are *F1-residential mixed with commercial/civic*, *F2-commercial/civic mixed with residential*, and *F3-multiple commercial/civic mixed-use*. In Kunming and Jinan, residential land allows 10% of the total building area to be mixed commercial use. These local land use classification regulations of mixed use inherently provide space for residential land to be mixed with commercial. The 10% of commercial in residential land constitutes the necessary neighborhood amenities in the form of ground floor stores, such as convenience store, laundry, café, post office, etc.

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<sup>9</sup> Code for classification of urban land use and planning standards of development land (GB 50137 –2011) issued by Ministry of Housing and Urban-Rural Development of China (MOHURD) in 2011.

The local planning regulations allow mixed land use, but challenges of mixed use still happen when planners, the government, and developers hold different opinions on the degree of mixed use. Taking a district in Jinan New East Station area as an example, the government wanted to have at least 20% of the total building area as commercial development, as this area is close to the New East Railway Station in Jinan and the government aimed to create a mixed land use urban center area. However, the developer argued that the real estate market could not support that large a proportion of commercial development since other surrounding areas have built some commercial buildings, and argued for reducing the ratio from 20% to 10%.

One staffer from the planning bureau claimed that: *“If the commercial is only 10%, this area would be basically a residential district and not a mixed-use TOD center that we want to build.”* The developer said in the interview that *“Currently in Jinan, the office building supply is much higher than the demand... A shopping mall may be okay, but not office buildings... Peter seems to listen to our opinions on mixed use, but I hope he could give us more convincing analysis on mixed land use.”* In this circumstance, Calthorpe claimed in the interview: *“Everywhere in the world, there is a special set of consultants and they do programming. When I ask the developer to provide the information, what I really mean is they need to hire somebody to do the market analysis if they don't have the in-house capability. This market study we planners do not normally do.”*

This case shows that the key issue of mixed land use in the planning and design process is to determine the appropriate degree of mixed use that can meet the market demand, the overall TOD planning goal, and the government's vision of the development. Currently,

the developer and government officials often count on the urban planners to provide the programming study, which is usually beyond the expertise of planners, who are more focused on the study of the physical environment. A deeper understanding of the market demand, no matter whether conducted by another group of consultants or urban planners themselves, would be helpful to provide more accurate guidance for the mixed land use in TOD planning.

#### **4.5 Pedestrian-Oriented Design**

One of the main goals of TOD is to create a walking- and biking-friendly environment and active street life by pedestrian-oriented design. In fact, if we look at the transportation mode shares of the cities, there are more people who walk in Chinese cities than in most American cities. However, the walking-friendly environment in Chinese cities is deteriorating rapidly, mainly due to the growth of automobile use. To adopt pedestrian-oriented design seeks to retain the tradition of walking as one of the main travel modes in Chinese cities. The pedestrian-oriented design that is discussed here mainly includes two parts—the design of a public space, such as a plaza and streets, and the pedestrian path network.

As for the public space design, one challenge is how to define good design: whether a good design is for people to use actively or to view; whether a good design is for people to make a living, or for tourists to appreciate. An interviewee from Shanghai pointed out that: *“TOD requires a good design in the transit station area. However, what is a good design? People’s understanding varies. For example, next to Yan’an West Road subway station in Shanghai, there is a large green area, but passengers cannot walk through it*



*but need to detour to the station. This green area design is only visually good, but maybe they think it is a good design.*” In fact, whether in a TOD area or any other place in the city, a pedestrian-friendly environment should invite people to use it and enjoy its convenience, but should not be a fenced lawn and disconnected from the surrounding urban functions.

# **Chapter 5 TOD Implementation and Government**

## **Administration-- Link 3 in the PPIP**

### **5.1 Institutional Coordination: Challenge or Not**

TOD is a comprehensive and composite planning concept and multiple government agencies are involved in the administration of TOD implementation. During the interviews, people from different stakeholders mentioned the agencies they have been working with in the implementation phase. Three major departments are urban planning, land and resources, and transportation. At the municipal level, the urban planning bureau often plays the leading role in TOD planning and implementation; the transportation bureau is in charge of the planning and management; and the land and resources bureau is responsible for the land granting and transfer. Other agencies include transit companies, rail transit companies,<sup>10</sup> landscaping bureau, traffic police department, fire department, etc.

Currently, at the municipal level, the Urban and Rural Planning Committee (planning committee) plays the role of coordinating different government agencies on the deciding of important planning issues citywide. Usually, the Party's secretary or the mayor of the city is the director of the city Urban and Rural Planning Committee, and all the related municipal agencies' directors and borough leaders are members. For example, in

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<sup>10</sup> In many Chinese cities, including all the case cities in this research, public transit companies and rail transit (subway) companies are two separate entities.

Kunming, the Party's secretary and the mayor used to be the director alternately.

Chenggong, a borough of Kunming City, established a government agency—Chenggong Planning and Land Service Center—to coordinate the planning and land departments in the implementation of Chenggong's TOD.

In the interviews, when different interviewees responded to the question about the current status of the coordination between different agencies in municipal government, they reported similar opinions: in major cities, generally the institutional coordination is acceptable. One urban planner from Shanghai said: *"There are some barriers, but they are not serious. At least in the developed cities, they can manage the coordination, because the Mayor pays attention to TOD...Once the municipal leader adopts and values TOD, it is easy to coordinate the government agencies."* An NGO researcher, who has been engaged in the planning and implementation of Chenggong's TOD, reported in the interview: *"From the cities we have been working with on TOD projects, the coordination between different entities has been fairly good so far."* Clearly, the leadership of the municipality plays an important role in planning implementation. The coordination between different government agencies does not become a great challenge to TOD implementation once a strong leadership of the municipality is in support of it.

However, the barriers between different agencies do exist, and they are largely due to the rules in different sections of the central government. The municipal-level agencies are not only under the administration of the local government, but also subordinated to the ministries of the central government. A municipal government official from Jinan pointed out in the interview that *"The coordination is not a problem at the municipal level, as*

*long as the municipality leaders adopt TOD. However, at the same time, different agencies are under the administration of different ministries of the central government. For example, the planning bureau is under the Ministry of Housing and Urban-Rural Development; the land resource bureau is under the Ministry of Land and Resources in the central government.*” The municipality does have the capacity to coordinate its departments, but when TOD planning has conflicts with each department’s rules and regulations, coordination problems happen.

## **5.2 Regulation Barriers and Capacity Constraints**

In addition to the planning department, other government agencies have their own institutional regulations that are related to planning implementation, and these regulations often have conflicts with TOD.

One great challenge related to institutional regulation is in the land granting process about mixed land use. In the planning bureau, mixed land use has been widely accepted. But to legally establish planned mixed use requires the right land use certificate from the Land and Resource department. Traditionally, according to the land leasing and granting regulations, the urban construction land can only be separated horizontally into different parcels, and each parcel can be authorized for only one land use type; vertically mixed land use cannot be authorized with different uses. As a result, after the vertical mixed land use was approved at the planning bureau in the government, the land bureau could not grant the right of use to different layers in one parcel. In the interviews, the author found that this barrier to vertical mixed use has been overcome in several major first-tier cities, including Beijing, Shanghai, and Shenzhen, in some pilot projects; but in second-

or third-tier cities, like Kunming and Jinan, it still exists to some extent. An urban planner and architect from Beijing reported the innovations of land granting in Beijing: *“We have applied the ‘three-dimensional staking’ method in land granting, and it has legally gone through the administrative process of the land department. Compared to the traditional two-dimensional staking, it adds another vertical dimension in land granting to fulfill the vertical mixed land use. This new method is worth popularizing.”* At the same time, this interviewee also admitted the incompleteness of the “three-dimensional staking” method at present, considering the property rights split—for example, disputes may happen when the foundation of a building has problems and causes damage to the higher-level floors of another property owner; however, it’s still an achievement in regulation reform and *“worth popularizing.”* Interviewees from Shanghai and Shenzhen also reported that, in these two cities, new regulations about the land granting in different layers to permit vertically mixed land use have been instituted. However, interviewees from Jinan and Kunming admitted that the mixed land use still hasn’t been formally adopted in the land granting by the Land and Resource Bureau.

TOD also brings great challenges to the traffic management department due to the unique dense road network that include couplets (the couplet is a pair of one-way roads to replace one wide artery road), one-way streets, and non-signal intersections. A government official from the planning bureau expressed his concerns in the interview: *“Even though we can build the roads [of the TOD plan] in Chenggong, I am still not sure if the traffic management will work. It will be very challenging... the one-way streets, the couplets, and more than 100 non-signal intersections all demand a very high level of*

*traffic management... Even Beijing and Shanghai have not done too much signal-coordination, not to mention Kunming.”*

It takes time for different government departments to come to consensus on TOD. For cities that achieved some TOD implementation outcomes, all experienced an incremental consensus-building process. A transportation planner from Shenzhen pointed out in the interview: *“When we look back, we can find that Shenzhen also experienced a consensus-building process. The TOD concept started with the planning bureau, but how to build the consensus with other departments was difficult, because they have the inertia of their own administrative systems. The real progress on vertical land granting has moved forward from the construction of the rail transit system.”* TOD brings new ideas, as well as new problems, to the administrative system. At the beginning, the government agencies may not reject TOD; they just do not yet have the solutions to the new problems it brings. The consensus on TOD across institutions needs to be built on the real problem-solving process.

### **5.3 Challenges from pursuing political achievements**

A TOD project usually requires a relatively long period of time to achieve a satisfactory outcome and create the social benefit to the public. When the local government officials aim to pursue political achievements in a short period of time, they may lead to wrong decisions that are contradictory to TOD.

The rapid development of an urban transit system creates the opportunity for TOD; at the same time, purely chasing transit growth often leads to unsynchronized transit and

land use. Take Beijing as an example. The number of subway lines increased from 3 in 2003 to 17 by the end of 2014, and the total mileage of Beijing subways is 527 km, ranked as number one in the world. However, some new subway lines or stations have not integrated with the land use development of the stations' surrounding areas. Some subway stations even sit in green space which is bounded by ramps of expressways, for example, Lianhuaqiao station on Line 10. What caused this inconvenient access was generally the time limit of the construction. A transportation planner from Beijing said in the interview: *“When the construction company needed to meet the completion date, which was decided by the government, the priority for choosing station locations was merely the places with less resistance and easiest to acquire.”*

#### **5.4 Land Leasing Financing and TOD**

Land leasing financing has become one of the major pools to generate revenue for local governments. It has great impact on the urban development strategies and the relationship between the government and the market, and hence influences the implementation of TOD.

Land leasing financing at the local level emerged after the fiscal reform in China in 1994 of the Tax Sharing System. In this fiscal reform, the tax administration was separated into national tax services (NTS), which were responsible for collecting central fixed and shared taxes for central government, and local tax services (LTS), which were in charge of local taxes (Man & Hong, 2011). Since the introduction of tax-for-fee and valued-added tax, of which 75% is taken by central government through NTS, central government revenue has grown rapidly. While this Tax Sharing System has secured the

increase of central government's revenue income, it has reduced some major taxes' revenue for local governments. However, local governments are responsible for the provision of many kinds of public service and also need to cover their own costs of administration. As a result, local governments started to seek for other revenue income, other than taxes, to fill the gap between the decrease of tax revenue and the huge expenditures; as a result, land leasing financing has become one of the major financing methods for local government. Land leasing financing refers to low-cost acquisition of farm land at the urban periphery, converting it to urban construction land with basic infrastructure, and leasing it to developers at a higher price of land leasing fee (J. Zhao & Block-Schachter, 2015). Although the land leasing revenue needs to be reported to the upper-level governments, local governments will still be able to control the expenditure of land leasing revenue (F. Zhou, 2010).

From the local government's standpoint, land leasing financing brings challenges to TOD implementation by encouraging governments to lease large parcels of land to big developers. In order to maximize the leasing revenue, local governments tend to lease land of super blocks for the one-time revenue income. Meantime, the land lease financing also tends to result in the mismatching of newly developed neighborhoods and public services. In addition to the super-block type of road network, single-use monolithic residential and industrial developments emerge where public services are still in the blueprint phase. The case of Tianjin Eco-city that was introduced in Chapter 1 demonstrates this phenomenon: the lagging-behind light rail, un-built local roads, and pedestrian pathways have blocked the TOD goals.



## **Chapter 6 TOD Implementation and Real Estate**

### **Development – Link 3 in the PPIP**

TOD not only brings a paradigm to planning and design, but eventually brings a new paradigm to construction and operation. As a result, in addition to the challenges of planning and design, in the implementation phase, TOD has been facing the inevitable challenges from the real estate market, which plays the important executive role of building TOD on the ground.

#### **6.1 Real Estate Development Pattern and TOD**

Many of the TOD planning techniques, such as small blocks and mixed land use, require diversification in the layout and function of urban space. The small-block neighborhoods in historical sections in cities were developed not only to adapt to the transportation mode at that time, but also for a small-scale development pattern. Take Boston in the U.S., as an example. From 1870 to 1900, the grid street and frontage lots system was the land plan to meet the need of land division for the single houses or row houses on each parcel (Warner Jr, 1962). However, in the contemporary real estate development pattern in China, small-scale development is impossible and the housing pattern is no longer single-family houses or row houses. Isolated single-use high-rise buildings with large footprints and super-blocks have become the most efficient development pattern.

The real estate development pattern is also influenced by the land leasing financing that was discussed in the previous chapter. In the land auction process, developers prefer to

acquire the lease right of a large piece of land from the municipal government. At the same time, the local government also welcomes big developers conducting large-scale development since revenue from land leasing can be easily generated quickly with fewer developers, as was discussed in the previous chapter. For example, the two developers (code named as A and B) from Chenggong in the interviews both had the development of multiple blocks. Including the roads and green land, the total development area of developer A was 9.7 ha, which included 9 planned blocks; developer B was in the land auction process and had already acquired part of the total land of 86 ha, which included 34 blocks. Compared to the traditional super-block development, with TOD the developers have to deal with more blocks and more internal local roads within the site.

As a result, it is very common for developers to try to negotiate with the government to eliminate the internal road in the site. An interviewee who works for the government and has been in charge of inviting investment to Chenggong in Kunming reported: *“When the developers come to Chenggong, they are often worried about and negotiate with us [the government] on two issues: one is that the blocks are too small, and the other is that there are too many roads [in their sites]. They have conflicting emotions. For both the developers ‘A’ and ‘B’, it has been a process for them to understand and support small blocks.”* Because of the efforts of planners and the local government, these two developers have gradually become receptive to the idea of TOD in general, although they still have encountered problems in the development process, which will be discussed later in this section.

The issue of who should be responsible for the construction of the internal local roads within a large development site, the government or the developer, still has not got a satisfactory solution. In Chenggong, two different projects have tried different ways to get the local roads constructed, but encountered different problems. In the first project, which was still in progress at the time of interviewing, the land for the internal local roads was leased to the developer by the government. In the planning permit, the developer was required to build the roads. However, because the total area of land increased as the local roads were included, the developer negotiated with the government to reduce the unit price of land granting to make sure the cost of land would not increase too much. Besides, although the developer would be responsible for building the internal roads, further issues on the maintenance of the roads remained unsolved, such as how to make sure the roads would be transferred to the government and be open to the public. In the second project, the government was to build the local roads and keep the right of land use. In this circumstance, if the developer wanted to build tunnels to connect the underground parking in different blocks, the right of land use would become a problem because the public owns the land and hence the underground part of the road. Further, even if the developer had a permit to build the underground parking under public roads, this part of underground parking could not be sold by the developer to their customers as the land is owned by the government.

## **6.2 Developers' Concerns on Cost**

A big concern from the developers is the cost of development. They argue that the small blocks would increase the upfront cost of construction. In an interview, a developer from

Jinan said: *“From the theoretical perspective, we generally accept Peter Calthorpe’s TOD concept; however, we have some concerns. For example, the small block and open-community pattern may make the security issue more difficult, because the residents would feel safer if there were a fence. Another concern is the underground parking -- in the small blocks we need to build more entrances and exits as there are more blocks, so the cost will increase.”* Developers from Kunming also expressed similar concerns over the cost increase of underground parking and security due to the small blocks.

TOD encourages convenient connections between the transit facilities and the surrounding development, but the connections will also increase the upfront cost such as building tunnels, bridges, and other facilities. The rail transit companies are responsible for the construction of transit systems. When the surrounding development of a transit station wants to be connected with the transit, rail transit companies often require a connection fee. One developer reported in the interview that the connection fee for one tunnel to a subway station was ranging from 5 million RMB to 10 million, depending on the negotiation and the involvement of the government.

### **6.3 Feasibility of Small Blocks for Commercial Development**

The ground floor retail space, which is encouraged in TOD by a small-grid road network, also faces the challenges of commercial type and volume. Some people argue that, in terms of the commercial type, the giant shopping center is the most popular type of commercial development in Chinese cities nowadays. Unlike in the American cities, where big box retail stores are mostly located in suburban areas, in China, they often sit in city center areas. The developers usually market this kind of giant shopping center as a

comprehensive recreational and retail center for the customers. In the interviews, some interviewees believe that the small-grid road network, into which large commercial development cannot fit, needs to be adjusted to be consistent with the commercial type.

TOD promotes the active street life by encouraging ground-floor stores on the small blocks. However, the ground-floor type of commercial development has conflicts with the big shopping complex, which is a popular retail commercial type. In the interview with a government official in Chenggong, the interviewee introduced an example of a developer reluctant to accept the small-block idea: *“Last year there was a developer who focuses on commercial real estate and could not accept the idea of small blocks. Although we provided commercial cases of small-blocks to them, they still believed that small blocks wouldn’t work for their large commercial complex and finally did not invest in Chenggong.”*

During the interviews, the author also found another case of the conflicts between commercial type and the small blocks. Wanda Group, one of the biggest commercial real estate developers, wanted to invest in Chenggong and build a Wanda Plaza in the central area of Chenggong. However, a Wanda Plaza, which has been built in many Chinese cities and achieved great business success, has its own standard real estate form: a big commercial complex with anchor stores, indoor retails, cinemas, hotels, office towers, and apartments. Wanda Plaza also has its own architecture and site plan pattern— a big complex building over 200 meters— but this pattern cannot fit into the small blocks in Chenggong TOD core areas. At the time of interviews in this research, the negotiation between Wanda Group and the local government was still in progress. Wanda did not

want to tailor their fixed pattern into the small blocks and asked for the permit to eliminate several local roads; the local government, on the one hand, hoped Wanda could invest in Chenggong and also wanted to implement the small blocks in the TOD plan on the other hand. The chances were that if the local government insisted on the small blocks of TOD in the regulatory plan, Wanda Plaza would need to adjust their commercial complex pattern in order to fit in; otherwise, the local government would need to revise the regulatory plan to make the road configuration fit the Wanda Plaza, but the TOD small blocks would be destroyed.

#### **6.4 Issues of Mixed Land Use Development**

Mixed use is highly encouraged in TOD planning to maintain a job-housing balance and reduce travel distances. However, the residential units that are built on the land of mixed use or commercial use have different requirements, compared to the residential units on regular residential land. These differences of regulation requirements become barriers to mixed land use development.

The first difference is the duration of the right of land use. When the Land Bureau of the government issues the Land Use Right Certificate, the durations of land leases for different types of land are different: 70 years for residential land, 40 years for commercial/tourism/entertainment land, and 50 years for comprehensive/other land.<sup>11</sup>

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<sup>11</sup> Source: Interim Regulations of People's Republic of China urban state-owned land use right transfer and transfer, Ministry of Land and Resources of China, [http://www.mlr.gov.cn/zwgk/flfg/tdglflfg/200601/t20060119\\_72175.htm](http://www.mlr.gov.cn/zwgk/flfg/tdglflfg/200601/t20060119_72175.htm)

As a result, in the real estate market, the residential units on mixed use land have only 40 or 50 years of right of use, much shorter than regular residential units' 70 years.

Second, the construction cost of units on mixed use land may be higher than on residential land, because buildings need to meet higher building code requirements. For example, in the interview, one developer reported: *"We have to install automatic sprinklers in our apartment because they are built on mixed use land and have to follow the fire code of commercial buildings, but the fire code of residential buildings does not require this. That increased our construction cost."*

Third, the utility fee of residential units on mixed use land is higher than that of regular residential units, including water, electricity, condo fee, etc. So when housing buyers consider the housing options, the higher cost of utility fees of units on mixed use land would become a disadvantage in the market.

Fourth, Chinese *Hukou* registration regulation also differentiates the right of land use between commercial and residential. Only residential buildings are valid for *Hukou* registration. As a result, people who own the residential units that are built on commercial land are not able to register their *Hukou* on their apartments, because these apartments are actually considered to be commercial buildings.

## **Chapter 7 Conclusions and Recommendations**

### **7.1 Tailoring PPIP to TOD Implementation**

This study applied the PPIP model in the analysis of the TOD implementation process in China. In order to establish TOD on the ground, the implementation needs to go through the four sequential stages of PPIP, which are 1) setting urban development goals, 2) adopting TOD principles, 3) TOD statutory plan formulation, and 4) TOD plan implementation. These four stages are not directly connected, but are mediated by a complex of factors that may have important impacts on the process as a whole (E. R. Alexander, 1985). In the original PPIP model, there are three links in-between four stages; however, compared to the other two links, Link 3—connections between statutory plan and plan implementation—is much more complicated in TOD implementation, and it is suggested to have two links between Stage 3 and Stage 4: the new Link 3 is Government Administration and Link 4 is the Real Estate Market.

In order to keep the implementation process moving forward, at each stage, there is one dominant stakeholder to make the decision that empowers the arrows of No. 4 in the PPIP diagram to happen. Thus, the research argues that to identify the dominant stakeholder is critical for us to understand the process.

The main stakeholders in TOD implementation are urban planners and researchers, government, developers, and residents. In Link 1 of PPIP, the government is the key stakeholder to enable the implementation to move forward, because the policy making



process is essentially a top-down process in China and the government's understanding and acceptance of TOD is critical for adopting the concept and principles of TOD.

In Link 2, the government—especially the planning department—remains the key stakeholder, while planners, who work for the government on statutory planning formulation, play a supporting role. The key barriers for translating TOD principles to statutory plans are two-fold—the capacity constraint of planners and conflicts between TOD and existing planning codes. However, the capacity constraint is largely because those planners have already become accustomed to the traditional planning methodology that is shaped by the planning codes, which are formulated by government-affiliated planning institutions.

In Link 3, the government needs to execute the TOD plan and multiple government agencies are involved. The government not only guides the implementation through regulations and administration, but also needs to directly deliver the public service part in TOD, including the transit service, public facilities like schools and hospitals, and many other public infrastructures' construction and operation.

In Link 4, developers are responsible to implement the service and products under the market domain: residential units, retail, office, and other commercial space. Notably, the interactive feedback loop between the New Link 3 and Link 4, i.e., between the government and the developers (market), determines whether the process can move to Stage 4.

To have two links between stages 3 and 4 is compliant with the objective of PPIP, which is recognizing and analyzing the complex interactions involved in policy implementation, and further develops PPIP to be tailored for illustrating TOD implementation. The four links model can help us to better identify the key stakeholders at different stages and links, and hence to disclose the problems that need to be addressed.

For a successful implementation process, an ideal pathway in PPIP is avoid or reduce any of the backward movements (*connection 3*) from any subsequent stage to its preceding stage, and make the implementing flows go to the next stage (*connection 1* and *connection 4*), and eventually accomplish the final stage 4 . However, the interactions between different links, including the feedbacks of *connection 3* and *connection 2*, are often inevitable. In reality, a specific TOD implementation project, depending on the scale of the projects and the overall implementation environment, can start at any of the four stages (*arrow 5*), if TOD has already been generally applied in, and gone through, the earlier stages. At the same time, it is also possible for the TOD implementation to have failed after any of the stages (*arrow 6*).

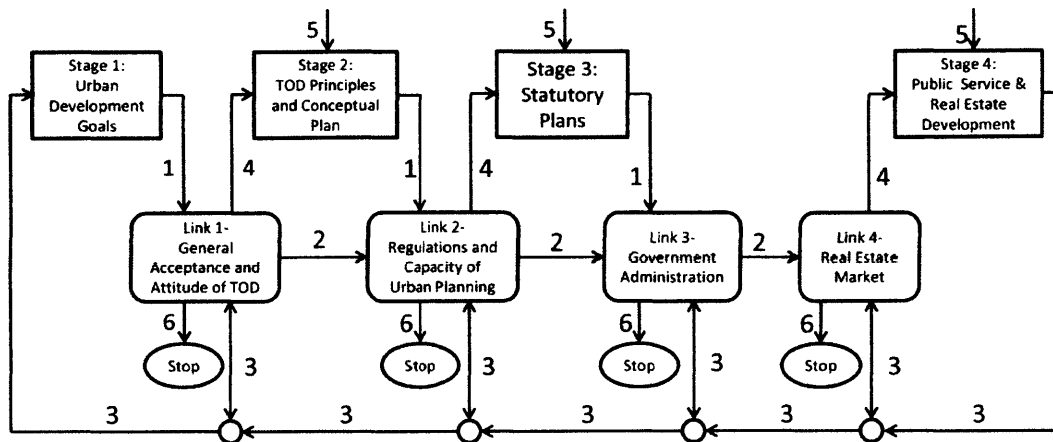


Figure 16. Customized PPIP model of TOD implementation

## 7.2 Challenges in Implementing TOD in China

- **In the mentality realm**

To adopt the concept of TOD in public policy, including urban planning formulation and other policies, requires the stakeholders to understand and accept TOD. However, there are great challenges in people's mentality due to the misunderstandings and incomplete understandings of TOD. The misunderstandings of TOD are two-fold. The first one is misunderstand "transit" as transportation, considering automobile-oriented development as "transit-oriented." The second one is to misunderstand the TOD concept as a static and outdated concept. A group of professionals tends to take for granted the idea that TOD originated from a totally different context and therefore cannot be applied in China.

TOD is a compound concept and has multiple principles, including transit, land use, and design. It has not been difficult for stakeholders to accept the general idea of TOD, although they often lack a comprehensive understanding of it. Furthermore, stakeholders

usually only select for implementation the principles that fit their own perceptions and needs, without fully adopting TOD. In the Chinese context, high-density development, among all the others, has been the most popular element of TOD. In contrast, pedestrian-oriented design has been the last principle of TOD for people to notice and implement.

- **In planning and design**

TOD brings a new paradigm of planning and design to the professionals. In TOD planning and implementation, some barriers are due to the inexperience of the professionals, who have been locked in the automobile-oriented planning and design philosophy. They were not taught in school, and are lacking, the skills to deliver a proposal that would promote transit, non-motorized transportation, and a human-scale urban environment.

More importantly, some of China's basic planning regulations and codes are contradictory to TOD and hence restrict the delivering of TOD planning. The planning regulation barriers exist in both national planning codes and local regulations. Regarding the national planning codes, the main conflicts between TOD principles and code requirements are: the auto-oriented hierarchy road structure, the over-wide spacing between arterial roads, the lack of consideration of mixed land use, and the rigid requirements on green ratio, FAR, building coverage, and building separations in residential areas. As for the local level, the regulation most in conflict with TOD concerns setbacks, which are often too large to create a human scale and active street life.

- **In administrative capacity and regulations**

Challenges in administrative capacity are partially caused by the incomplete understanding of TOD challenges and also strongly associated with administrative regulations. Even when the stakeholders accept and are willing to implement TOD planning principles, the outdated or irrational regulations prevent people from establishing TOD. In the government administrative process, the regulation barriers are mostly related to one factor in TOD—mixed land use. One set of barriers are the different regulations between residential units on commercial/mixed use land and units on residential land: duration of right of use (40/50 years and 70 years), different utility price, the restrictions on *Hukou* registration on commercial land, etc. The other critical barrier is in the land granting process: an important challenge is that land granting in layers on vertically mixed use land have not been overcome in most cities.

At the municipal level, a strong leadership that supports TOD can significantly overcome the institutional coordination barriers to TOD implementation in terms of communication and consensus building; however, when the coordination challenges are embedded in institutional regulations, especially those enacted at the state level, they are still great obstacles. Institutional design could be one form of regulation barriers. Currently, the fragmented government agencies and the lack of cooperation mechanisms constitute great challenges to TOD implementation.

The land leasing financing system has become a promoter of super-block type urban development and results in the mismatch between new residential development and public services that are lagging behind, including transit.

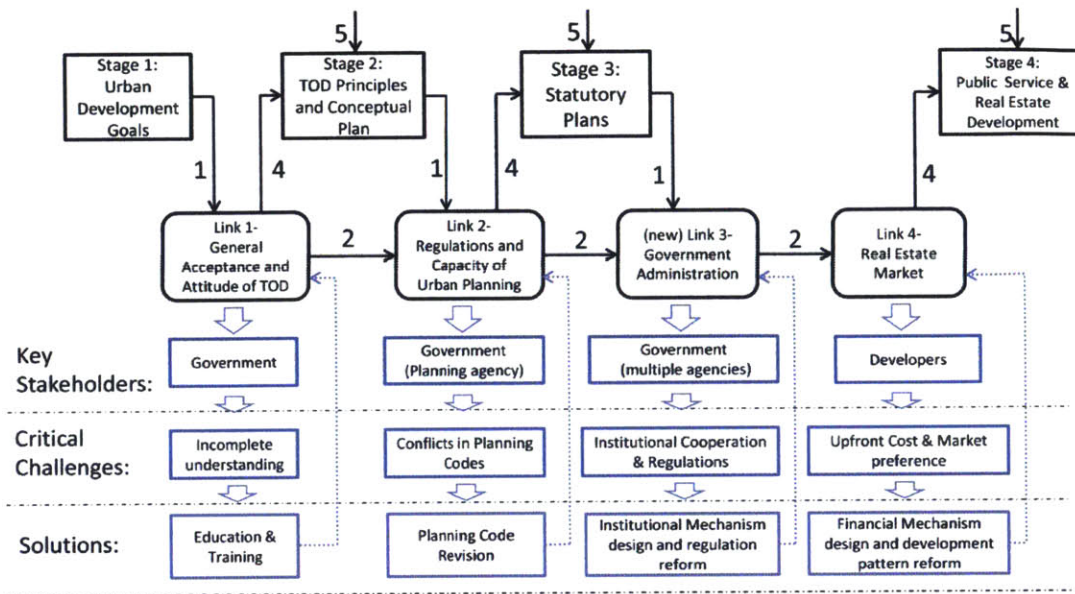
- **In the real estate market**

When the TOD planning principles and techniques are contrary to the market demand, challenges to TOD are generated from the market.

One challenge from the market is the degree of mixed use. While TOD tries to promote mixed use, the market demand analysis needs to be studied to make sure TOD planning matches the demand side. At the same time, TOD planning, as a government policy tool, should also take the responsibility to address the market failure issue. For example, in a TOD plan, the commercial, civic service, and open space need to be sufficient to ensure a livable environment.

The second challenge is the real estate development pattern and small blocks in TOD. At present, both the real estate market and the local government favor large-scale developments that cover multiple or dozens of small blocks. This kind of large-scale development brings great challenges to the small blocks and diversity in TOD.

The third challenge is that the real estate developer, and sometimes the public sector, both weigh the short-term increased capital costs much more than the long-term social benefit gains from TOD. The developers show concern about the increased upfront cost of underground parking and security guards, while the government may also worry about the increased costs for maintaining the small blocks and feel constrained by the institutional cost in coordination and administration.



**Figure 17.** Analysis and suggestions for implementing TOD through PPIP

### 7.3 Comparison between TOD Implementation in China and in the U.S.

This study has been focusing on TOD implementation in the Chinese context. However, the findings of this research can also be lessons for reference for TOD in other regional contexts, because the development of mass transit systems in China has been significant and the TOD practice in China has also been extensive. Thanks to the research that has been done by Cervero and other scholars (Cervero et al., 2004) in the U.S. , a comparison of TOD implementation in the two contexts is possible and could provide us a more comprehensive understanding of TOD.

As for the stakeholders in TOD implementation, both in the U.S. and in China, the compositions of stakeholders are similar: multiple government agencies, private sectors,

professionals, and local residents. Among all the stakeholders, the government often plays the role to initiate TOD and lead the implementation, however, the leading agency in China and the U.S. is different: in the US, the transit agency often plays the leading role among all different agencies; in China, the leading government agency is the planning bureau of municipalities.

Related to the different leading agencies, the main goal of TOD are also different in the two countries. In the U.S., to increase the transit ridership is often at the top of the list of TOD goals that were identified by transit agencies' respondents. The community economic development and broader smart growth benefits are the secondary goals. In China, two main reasons for municipalities to adopt TOD are to relieve the congestion by integrating the development with transit and to increase the land value by increasing density. To increase transit ridership is not a big concern of transit agencies and the municipalities.

In the planning and design phase of TOD implementation, research in the U.S. found several unique barriers to TOD: 1) the “congestion conundrum”, which means the development around transit stations increases spot congestion and leads to some areas to reduce the density; 2) the multi-modal access can make the station design being detract from the quality of walking; 3) there are conflicts between the park and ride and more human-scale station designs, and many transit officials in the U.S. insisted on providing sufficient parking or one-on-one parking replacement policies; 4) mixed land use, especially vertical mixing is not accepted by the developers (Cervero et al., 2004). In fact, the first three issues of the four are more related to the joint development at the transit



station scale, and hence they were not reflected in this research's interviews, which mostly focused on a larger scale TOD projects. The last issue about mixed land use has been discussed a lot in this research and we can find several differences between the barriers to mixed land use in China and those in the U.S.

In the U.S., vertical mixed use was found to be particularly problematic, because the developers view it as a risky endeavor and prefer horizontally mixed use. In China, mixed use, both vertically and horizontally are generally accepted by the developers. However, regulations, especially those about land leasing, become main barriers to vertically mixed use.

The regulation barriers to TOD planning and design in China have been documented extensively in this study, including the conflicts on setbacks, building separations, mixed land use, and road network layout. In contrast, similar problems were not reported in the research on the U.S.

As for fiscal barriers in TOD implementation, both similarities and differences can be found in the U.S. and China. First, fiscal barriers exist in both countries. From the perspective of the private sectors, in the U.S., developers worried about the construction cost of multistory structures and expenses of infill development against building single-story structures on greenfields or the suburban edge; in China, the increased cost of underground parking and security of small blocks were reported by the developers. From the public-sector side, the concerns on funding resources were reported in the U.S at the local levels about the station-area planning and the construction cost of infrastructure. However, in the interviews with other stakeholders in China, especially for

those interviewees from the government agencies, funding was not considered as a huge barrier to TOD implementation.

Another major barrier that was found in both countries is inadequate institutional coordination. This is not surprising because institutional coordination can be viewed as an inherent feature in TOD, which is a compound theory and covers multiple fields. However, it has been reported by multiple stakeholders—government officials, researchers, and planners—in this research that, in China, if supportive leadership at the municipal level exists, it can greatly diminish the cooperation barriers.

From the perspective of the real estate market, in China, major contradictory opinions towards TOD are mainly focusing on the small-block and non-gated community; while in the U.S., it was reported that developers mostly do not accept vertical mixed use.

## **7.4 Recommendations**

TOD promotes compact and mixed-use development, the integration of land use and public transit, and a pedestrian-oriented environment. By changing the physical environment, TOD can change people's travel behavior to encourage non-auto travel in statistically significant ways (Cervero & Kockelman, 1997). It has been widely recognized that overdependence on the automobile has created various problems and is unsustainable for cities. To implement TOD can help cities to relieve traffic congestion by reducing the use of automobiles, increase the land value in transit station areas by improving accessibility, and create social benefit by building a pedestrian-oriented and human scale urban environment.

However, we should also admit that there are great barriers to implementing TOD, which brings a new paradigm to planning and design, government administration, and the real estate market, in this period of rapid urbanization and motorization in China. Based on the challenges that have been identified in this study, the recommendations for establishing successful TOD on the ground are four-fold:

- **Education and training program**

From the interviews, this study found that general and accurate knowledge of TOD is far from sufficient in China. Regarding the main principles in TOD, the importance of pedestrian-oriented design is the most critical part of TOD, but is usually found to be missed or ignored. Education in TOD principles and the training of planning skills need to be carried out for students, professionals, and government officials.

- **TOD planning guideline and planning codes revision to provide the legitimacy for TOD planning**

A national TOD planning guideline for rail transit is currently in the formulation process. Although only focusing on rail transit-related TOD, it would be a good starting point for providing guidance for professionals on TOD planning. In the next step, a review and revision of the planning and design codes and regulations need to be conducted both from the central government's ministry level and the municipality level.

- **Analysis and reform of financing mechanisms of TOD**

TOD is a planning concept mainly looking at the physical environment. However, in order to establish successful TOD, research on the financial mechanisms is necessary, in order to reassure the real estate developers and provide sustainable economic solutions for the government.

The financing mechanisms of urban development need to be adjusted. The property tax could be an effective alternative revenue resource to land leasing financing to provide the ongoing financial support needed by cities. In addition, the government grants from the central government on TOD should be provided to incentivize the local municipalities and developers to implement TOD.

- **Institutional structure reform to reduce the institutional barriers in both administrative and development processes**

An institutional structure should be developed to bind the land value increase, which is created by the transit accessibility increase, and the upfront investment of TOD. TOD not only leads to transportation and social benefit, but also creates economic benefit which is reflected in land value increase. Only by internalizing the increased land value in the TOD planning and construction process and compensating the upfront cost investments by the government and developers, can the government and developers be incentivized to implement TOD.

## **7.5 Research Limitations**

- The interviews mainly targeted the professional group of people, and the sample size of residents, who are major stakeholders in TOD, is small in this research.

- The land leasing financing mechanism is identified as one fiscal barrier to TOD implementation, but this research has not included in-depth analysis by interviewing actors in the financing field of urban development.

## **7.6 Future Studies**

- The institutional mechanism deserved more detailed study. This research has identified the main barriers and challenges. However, the financial mechanism and institutional mechanism need to be studied to overcome these barriers to successful TOD implementation.
- This research conducted a very preliminary comparison between the TOD implementation in China and in the U.S. For future studies, a more comprehensive comparative analysis of the implementation mechanisms of TOD in different contexts in cities that have either successful or unsuccessful experiences will help us to better understand the effective methodologies to implement TOD.

It will take time for the recommendations in this study to become effective. Researchers would only be armchair strategists if depicting the benefits without successful, tangible TOD projects. Fortunately, the rapid urbanization not only brings challenges but also creates opportunities for TOD pilot projects. The continuous effort on the TOD planning implementation in Kunming, Jinan, and many other cities will help people to better understand TOD and establish TOD on the ground in China.

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## **Appendix: Interview Guidebook**

### **Section I**

#### **1. The acceptance and popularity of TOD concept**

- 1) Could you recall when did you first know about the concept of TOD?
- 2) Do you agree that these main principles could be or should be adopted in the urban planning in China?
- 3) If people agree with TOD, which aspect of the benefits of TOD would they value most: for example, transportation benefits, economic benefits, or social benefits? Or most of the clients think the benefits of TOD are comprehensive and include all of the above?
- 4) In terms of the real estate market, how does the developer in China accept the TOD planning?
- 5) How about the feedback from the government officials on your TOD planning proposal? Do they agree with all the TOD planning features?
- 6) As for the urban planners and other professionals on the local team in China, do you think most of them agree with the TOD principles?

#### **2. The planning and design of TOD**

- 1) Do you think that TOD, which originated in North America, needs to be adjusted to fit the context of Chinese cities? If yes, how could TOD adapt to the Chinese context?
- 2) In the planning projects you have been involved in and when they have the mass-transit infrastructure (subway, street car, or BRT), was the TOD concept applied?
- 3) At which level of the statutory planning system in China do you think TOD should be integrated? Master plan, regulatory plan, or site plan?
- 4) Do the TOD planning principles meet the requirements of the national planning code and local planning regulations in China? Are there conflicts? For example, does TOD conflict with the solar spacing code, the residential planning code, land use code, etc.?

- 5) If you agree with TOD, do you think the subway, light rail, street car, and BRT all have the capability to leverage TOD? (The urban form maybe different in terms of density, but all these types of transit have the capacity to shape the city and create TOD?)
- 6) In terms of the theory of TOD itself, do you think it requires further development/improvement? For example, it has not been clearly explained how to determine the density (FAR) of the development. At the same time, in terms of mixed use, TOD principles do not provide the planning methodology to determine the proportions of different types of land use. What do you think?

### **3. The implementation of TOD**

- 1) In terms of planning administration, do you think that TOD requires a higher degree of cooperation between different government agencies than the traditional planning does?
- 2) In the implementation of TOD, is there an institutional structure for better cooperation? What do you think about the importance of institutional cooperation for TOD implementation?
- 3) Do you think that funding is a huge barrier to implementing TOD planning?
- 4) What are the biggest challenges to TOD implementation in your opinion?
- 5) What are your suggestions for TOD implementation in China?

## **Section II**

Your comments on the research methodology, core issues, framework, etc. will be appreciated.