A Study of TOD on the Regeneration in Historical City Center

Under the Background of High-speed Expanding Cities in China

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Abstract — This paper discusses the Transit-Oriented Development used in the process of regenerating the historical center, based on the research of the development and the achievements in TOD of different cities in the past twenty years. The TOD has already showed the potential in regenerating historical centers. But considering the facts of Chinese cities that under high-speed expanding, it is anticipated to promote some integrated thinking of the TOD in regenerating a historical city center, which is suitable to the scale and form of the old urban fabric in this paper.

Transit Oriented Development (TOD) is a mode mixed-use residential or commercial area designed to maximize access to the public transport, and often incorporates features to encourage transit ridership. Transit-oriented development based on transit system, help improve efficiency of land use and transit operations in neighborhood in different areas of city and make them work together. While over the past decade, in most of the developing countries, the cities are facing huge problems on regeneration in the historical city center. The confliction between the worth of historical city center and the demanding of rapidly urbanization arise in many aspects.

Key words — Transit-Oriented Development; historical city center; transformation; spatial reconstruction; public transportation; connection.

1 Introduction

In almost all the developing countries, cities are growing in a rapid speed of urbanization. Because of the high density in the old city center, the requirements of urban expansion, or the new definitions for the urban, many historical cities choose to build new districts instead of demolishing or rebuilding the old center. This is a period that a city experiences a great revolution on its form, which is also a big transformation.

Mostly, the historical city center, which is limited by its form and scale, has several problems. For example, the traffic jam during a rush hour, the confliction between high land price and low living quality, the lack of public spaces and living spaces, and the huge area of protected heritage buildings. While during the transformation period, some of the main functions will move out of the historical center, such as the local government, social service organizations, business companies and train stations. Those changes mentioned above will bring several influences to the city and its residents. It can be a challenge that the old center may lose its life, while it can also be a chance to solve the problems in old center by reconstruction.

There are several Chinese cites, especially those historical cities, keeping expanding in a high-speed determined by the top-down politic system; while in the high land price area of the historical center, urban fabrics are not constructed in an efficient way. There is an emergency that those Chinese cities should find a way to regenerate the historical city centers to solve these problems.

Transit Oriented Development (TOD) is a mode mixed-use residential or commercial area designed to maximize access to the public transport, and often incorporates features to encourage transit ridership, first put forward by Peter Calthorpe in 1993. It is the reflection of the Neo-traditional Planning, which is trying to get of the “pure” functional planning in space, achieve a balance in a diversity of both functions and residents in space. Based on the experiences in North America and Europe, and the achievements of successful cases such as Rosslyn-Ballston corridor in Arlington, the TOD emphasizes the organization of open space by a public transportation. The public transportation including railway, subway, light-rail, tramline and bus lines,
can be a method to reconstruct the traffic system and the life style of old town in spatial, and make it connective with the new district as well.

This paper discusses the TOD mode used in the process of regenerating the historical center, based on the research of the development and the achievements in TOD of different cities in the past twenty years. The TOD has already showed the potential in regenerating historical centers. But considering the facts of Chinese cities that under high-speed expanding, it is anticipated to promote some integrated thinking of the TOD in regenerating a historical city center, which is suitable to the scale and form of the old urban fabric in this paper.

2 The overview of TOD development

2.1 The brief history of TOD development
Transit Oriented Development (TOD) is a mode of compact mixed-use residential or commercial area designed to maximize access to public transport, and often incorporates features to encourage transit ridership, first put forward by Peter Calthorpe in 1993.

At the end of the 20th century, two trends of “Comebacks” occurred in North American cities. One trend is that people began to come back to inner city, together with the investments, which made the city center regarded as an ideal place to live ever than any other periods after the World War II. Another one is that the more attention was paid to the rail-transport than the highway system, so planning in city rail or public transport system kept on going. It is the first time that the growth of public transportation usage had exceeded the growth of private transportation after the World War II. The compact mixed-use projects in walkable area around amount of public transportation stops revived the center to be active, which leads to a new attention to the public transit oriented in lots of American cities.

As we all know, since the wide usage of private car in the United States in the 1920s, the centrifugal trend was showed in commerce, industry, and society group (race, economical class etc.). The Auto-oriented Development and urban sprawl leaded to a low-density landuse and “country on wheels” as the symbol of the American Dream, which mainly rely on the auto instead of public transport.

But because of the crisis on energy, environment, and the pressure from transportation and investment, a better mode of development for accessibility and mobility was advanced, which aims to achieve a contribution in area in a high efficiency. Based on this, different from the Suburban Sprawl mode, a concept of Neo-urbanism was put forward. It advocates a “diverse, mixed-use” projects, to created a kind of “compact, vibrant and walkable” community, which emphasis on the relation between public transport service and the land use.

In the year 1993, Peter Calthorpe put forward a new planning idea different from the old rules as follow:

i. The direction of growth in region should be the same as the public transportation, which can be more compact in frame.

ii. The “pure” functional zoning rules can be replaced by the multiple, diverse and mixed-use walkable rules in planning.

iii. The urban design should focus on the public open space that follows the scale of people, but not the scale of autos and private space.

In this new idea, TOD was one of the most important tools being widely used all around the world in different levels such as regional planning, community planning, and urban design. ¹

2.2 The core idea and elements in TOD planning theory
In general, there is not a clear definition of TOD; different local agencies always have their own definitions adapted to local situation. Most of the definitions related to smart-growth and sustainability principles emphasized the importance of high-quality pedestrian environment, and the mixed land use in a compact context. The agreement of how to constitute a TOD is the pattern of dense, diverse, pedestrian-friendly land uses near transit nodes under the tight conditions.

The common elements of a TOD mode have been concluded as follow:

- The compact and mixed land use
- The well-developed public transport service around
- The exploitation of land that can help to increase the usage of public transportation
- High-quality in pedestrian and cycling environment
- Public open space and infrastructure close to the traffic node
- Traffic node related to the center of area

![Figure 2.1 The Urban Structure based on “TOD”](image)

¹ Qiang, M, “Recent Studies on Transit-oriented Development in North America”, in Urban Planning Overseas, Vol.5 (2009), P.228
A typical TOD consists of the following elements: public traffic node; commercial core; office area; open space; residential area and secondary area.

**Table 2.1 The Basic Configuration of “TOD”**

<table>
<thead>
<tr>
<th>Relation</th>
<th>Function</th>
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</thead>
<tbody>
<tr>
<td>Public traffic node</td>
<td>The center of TOD</td>
</tr>
<tr>
<td>Commercial core</td>
<td>Nearby; Combined destination</td>
</tr>
<tr>
<td>Office area</td>
<td>Neighborhood</td>
</tr>
<tr>
<td>Open space</td>
<td>Center; Around by other function</td>
</tr>
<tr>
<td>Residential area</td>
<td>Neighborhood</td>
</tr>
<tr>
<td>Secondary area</td>
<td>Outer around</td>
</tr>
</tbody>
</table>

According to the top 5 in U.S., the general goals of TOD are increasing ridership; financial in nature (promoting economic development and job growth and raising revenues for transit properties); raise revenues; enhance livability; and widen housing choices.

TOD, as one of the more visible forms of smart growth, is increasingly viewed as an antidote to traffic congestion, the isolation and detachment felt in many suburban communities, affordable housing shortages, and inner-city decline and disinvestment.

TOD can spur the redevelopment of declining neighborhoods (e.g., downtown Long Beach, California, and Arlington Heights, Illinois), spawn new suburban villages (e.g., Pleasant Hill, California, and Orenco, Oregon), breathe life into older suburban downtowns (e.g., Bethesda, Maryland, and Plano, Texas), and speed up the transition of places suffering from slow commercial encroachment (e.g., Ballston, Virginia, and Rutherford, new jersey).

In fact, TOD is providing a neighborhood living with a better quality, the life style mainly by walk, bike and public transport but less drive to reduce stress, and encourage one to meet neighbors can offer a safer living environment. The word “livability” means clean air and water, safe streets, positive relations, affordable homes, quality green open space, public education, uncongested road, and low taxes when residents mention it.

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3 Hua Xiaoye, C.L., Bai Huua, “Thinking on Application of Transit Oriented Development in Chinese Cities”, in Transport Standardization, 200(2009), P.81
The Methods and lessons of the Boston case residents
the needs how to provide sacrificing modernity and mobility.
TOD in this city is about the way the city has tried
cor the trolley and interurban lines made the Boston
buildings and neighborhood were planned closed to
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transportation.

2.3.1 Boston
Boston is a city that grew up around public transportation. For Boston, TOD was once the only type of development. Most of the longstanding buildings and neighborhood were planned closed to the trolley and interurban lines made the Boston core a strong character of TOD.
TOD in this city is about the way the city has tried to take back its old neighborhood character without sacrificing modernity and mobility. The challenge is how to provide diversity in service that can match the needs of the modern business and upscale residents accustomed to a larger space.
The Methods and lessons of the Boston case in TOD are concluded below (see Table 2.3).

2.3.2 Portland
Portland’s experiences with TOD have evolved over 25 years, from being largely an afterthought to becoming one of the primary considerations in rail facility planning. In Portland, TOD has become a part of the Regional Policy Framework, which was comprehensive growth management at a community and regional scale.
The greatest attention to TOD is focused on the stations of the Portland Streetcar and the region’s three light-rail lines. The projects included the Cascade Station, Sunnyside Village, Lexington Park, Richmond Place, The Yards at Union Station, are successful and worth to learn from.
The core objective and conclusion of the Portland case in TOD are concluded below (see Table 2.4).

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Figure 2.5 A mixed-use TOD combining 314 units of for-sale called Center Commons in Portland where TOD has high transit use increase from residents’ previous levels.

Table 2.4 The Case Study of Portland

<table>
<thead>
<tr>
<th>Portland Core objective</th>
<th>Building community on a regional scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Only transit-friendly development occurs near station, ensure investment in light rail</td>
</tr>
<tr>
<td></td>
<td>Balance for traditional development in special place (station area)</td>
</tr>
<tr>
<td></td>
<td>Seizing the opportunity afford by rail transit, part of broader growth management strategy</td>
</tr>
<tr>
<td></td>
<td>Rezoning influence area around station</td>
</tr>
<tr>
<td></td>
<td>Public investment and planning focus on the greatest opportunity station area</td>
</tr>
<tr>
<td></td>
<td>Broad-based core support TOD</td>
</tr>
<tr>
<td></td>
<td>Self-sustaining framework</td>
</tr>
</tbody>
</table>

Conclusion

- Transit investments, a means to the end of accomplishing multiple goals
- Early light-rail system shape the opportunities for TOD
- Continuing to raise the bar for TOD

2.3.3 Copenhagen

Copenhagen was successful in urban frame because of its famous “finger plan”, which promoted several corridors connecting to the core centre in region. TOD, as a method, combined metro lines along the corridor with service, business and dwelling around the station in suburban; and combine the public transportation with pedestrian and cycling together at the same time.

Meanwhile, the policy of control in private auto transportation makes Copenhagen a typical case in TOD that mainly relies on the public transportation. The methods and lessons of the Copenhagen case in TOD are concluded below (see Table 2.5).

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10 Ibid, P.43
Tool Characteristics

- TOD plan in Region, promoting the connection with inner city.
- Controlling of private auto transportation.

Methods

- All fingers connect with the inner city, maintain and strength the transit function of inner city
- Limit the auto growth by reduce parking area, drive the city by bike and public transport
- Recommendations of all the projects development concentrate around the public station, within 1km.
- High density around the stations
- Consummated pedestrian and cycling infrastructures, and hubs for transfer in public transport, change some of auto roads and parking into cycling.

Lessons

- Activities in city should be considered in a regional scale, so as TOD planning, a neighborhood planning would cannot change the land use and transport mode, which would not benefit as much as expect.
- Public rail transport and the land use can supplement each other by a positive cycle, which promote the TOD moving forward.
- Street is a place not only for transportation, but also for daily activities.

2.3.4 Chicago

The case of Chicago is about a few communities that have the resources, initiative, and leadership to tap into the market for compact walkable development around transit.

TOD is on the rebound in suburban Chicago, there was a growing number of communities along Chicago’s Metra commuter-rail line that use TOD as a part of a conscious strategy to reinvest in and revitalize downtowns.

The tools and conclusion of the Chicago case in TOD are concluded below (see Table 2.5).

Table 2.5 The Case Study of Copenhagen

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>The finger plan</th>
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<td><strong>Copenhagen</strong></td>
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Table 2.6 The Case Study of Chicago

<table>
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<th>Characteristics</th>
<th>Great Chicago region with Matra rail corridors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chicago</strong></td>
<td>Different levels of services in light-rail and heavy-rail systems through days. Concentrated in peak hours within downtown and suburban.</td>
</tr>
<tr>
<td><strong>Tools</strong></td>
<td>Regional Technical Assistance program (RTAP) help to develop station-area and public outreach associated with TOD. Enhanced pedestrian circulation, improved local bicycle and automobile access. Addition of housing and utilities near station. Commuter-rail sines, using TOD to reinvest in and revitalize the downtown.</td>
</tr>
</tbody>
</table>

Figure 2.8 Great Chicago Region Plan with Matra Rail Corridors

- Place the commuter parking away from the platform to save the land into civic spaces and other uses.
- Careful attention to detail design that really meets the transit need and use the station to anchor vibrant places to attract people.

**Conclusion**

- Long-term view is important than a short-term, the success will be pursuing for 15 to 20 years.
- Developing tools that leveraging TOD to achieve a well-designed walkable, compact development in downtowns more rely on the public investment for upgrading public infrastructure and rehabilitating older buildings.
- Take a balance between commuters parking convenience, bus transfer and land economic. Place and size should are important.

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2.4 Conclusion
TOD planning is a way to improve the relationship among the “increasing transit ridership”, “Maintaining landuse equity” and “enhancing living quality”. And based on these, TOD also forms a new cycle of the landuse and traffic system, which can be regarded as a natural-sustainable cycle. It is a method that can be used in all those area that need a sustainable urban design based on the traffic system, and help those to form a new structure of region and neighborhoods.

For the historical city center represents the past of the city, normally it has the cultural significance concealed in the buildings and places by shape, size and locality form. It carries two essential qualities: “the socio-cultural values that signify the role in defining sense of place, community belonging and social cohesion and the environmental capital that is represented by their buildings and urban infrastructure”(Rodwell, 2007).

Most of the historical city centers showed their social-cultural values through (heritage) buildings, which represent the past, present and future. It is the foundation of present, the way citizens treat them reflects the view of a city, which will effect the future generation.

In addition, the (heritage) buildings and so-called places in historical city center related to a collective memory between generations. The memory of a friendly living environment and life style cannot be separated from the body of buildings and places. In another word, it had become a part of our lives. There are five reasons of the importance of the historical center preservation promoted by Stripes (1983).

3 The study of historical city center
3.1 The characteristics of historical city center
The historical city center, especially in some of the cities with long histories, served the cities as the center of trade, living and entertainments for centuries. It was described as a “vibrant, closely, interlinked component of its new, enlarged form, performing an essential and distinctive socio-economic role in daily life of its citizens”(Giovannoni, 1998).

On the other hand, the historical city center also has the irreplaceable value in economic aspects. As Porter (1995) described that the four elements of the historical city center can be regarded as the advantages.

The strategic location of historical city center at least used to be the most valuable areas in a city, which related to flourishing commerce, busy traffic nodes, administrative center and compact living. The Local market demand shows the most integrated area and streets in a natural way itself, even though the other markets saturated. Integration with regional clusters, the more compact the historical city center and integrate the network are, the stronger competitiveness in economic the area would have. Human resources, the local residents in historical city center are more likely to be poorer than other parts in city, they are more eager to have

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13 Yu Jie, Y. Xiaoguang, Yin Rui, Xia Sheng-guo, “Public Transport Planning of Developing City Based on TOD Mode”, in Journal of Traffic and Transportation Engineering, Vol.7 (June 2007), P.107
a nicer work with better income to support an improvement of living quality.

3.2 The challenges that historical city centre faces during a high-speed expanding period

While the historical city center plays an important role, the rapid-city development due to industrialization, modernization and globalization has demanded new spaces around the old center as a result of urbanization. The new districts and CBDs form the new identity of modern cities, which change the structure and living style of residents. The enlargement of urban area leads to a demand-oriented shift of evolution in transport method, in order to connect different districts and areas. The auto-oriented development changes the inhabitants’ movement behavior from walking to driving. Once the new custom of car-depend formed, the traffic problems occurred. Most of the networks in historical center are compact and designed to fit with the pedestrian and bicycle; the lively narrow streets cannot accommodate the need of sufficient infrastructure.

Meanwhile, because of the movement in urban function, the focus of government switched to new districts and new infrastructure together with the job attractions and a diverse living environment attract inhabitants. The historical city center was no longer the concentrate of people’s daily life, but only a place to go because of some special reasons such as museum and heritage visiting, or location of city hall.

There arise two conflicts between the historical city center and the new districts:

First, the conflict between impairment of role that historical city center played in function, the imperfect infrastructure and the pressure that brought by the rapid development in whole city and area expanding.

Second, the willing of pursuing a better living quality, employment chances and spaces drive the migration to new district, while the urban conservation preserve the whole ambience including cultural significance as well (Thorsby, 2002; Cohep, 2001). Trying to preserve the socio-cultural characteristics as an identity alive is not as easy as building a modern identity in new districts.

3.3 The special facts of historical city centre in Chinese cities

Different from other developing countries, China has its own background that brings more challenges for those cities with long histories. With the new perceptions with modernization brought in, the civil view of value, life, and history were evolved gradually. Both the government and people have the eagerness to chase a high-speed development, which leads to a rapid expanding in urbanism, and the fragments of traditional urban fabric in both social and spatial aspects.

Meanwhile, within the top-down politic system aiming on rapid development, some of the conflctions mentioned previous become worse. The fast shift in urban function reflects more problems in the most compact area of historical city center.

The specialist facts in most of Chinese cities’ historical city center are the confliction between “preservation” and “renewing”, where the “renewing” was understood as demolish and rebuild. Apparently, some riots happen during the illegitimate urban demolish program, the low income residents are not willing to leave their houses, while high incomes migrate to suburban for higher quality, the identity of culture and history is no longer alive, and the pressure of infrastructure such as sanitation and transportation become higher.

On one side, the pressure from urbanization and renewing demands for the improvement of living quality, environment, infrastructure, service and structure work. It is emergent to be taken into consider to fit the civil need and development in economic.

On the other side, from the culture aspect, cities ask for memory of history to be alive and keep the city brand, seen as the identity of historical city center. That means the historical city centers need to be regarded in a different way from other districts, the fabric such as streets, buildings, spaces and residents in a traditional scale would be the character.

The conflction always happens in Chinese cities because it is hard to find a balance between the two sides.

3.4 Conclusions

For the importance of historical city centers, and the threats that it faces during the urbanization process, the cities that in the special Chinese conditions need to find a way while regenerating their historical city centers.
The key point in historical center regeneration is to keep the value of tradition in culture, history and art, depending on the regulating of urban structure movement. The fastest cycle of demolish and rebuild is negative which will bring irreparable consequences, while a slow natural cycle shows below would be more positive and sustainable to the city.

As a conclusion, there are some rules during the regeneration in Chinese historical city center.

- Combine the regeneration planning with the planning of new districts. Consider the city as a whole, none area could be developed independently, and the movement in one will always have influence on other.
- “Preservation” and “renewing” are not two opposite processes. How to fit the new requirements and protect the traditional value is the most important topic.
- The improvement in old urban fabric would not show the successful outcome at once, it is a long process.
- Mostly, regeneration in a compact historical city center is a subduction and shifting, aiming to provide more services and public spaces within a friendly scale.
- Notice the impact of human activity; make use of the relationship among attraction, spatial configuration and movement to reform the structure and environment of historical city center.

4 Integrated thinking of the TOD in regenerating Chinese historical city center

In the United States, Transit-oriented Development has been regarded as an important means not only in promoting smart growth, but also in injecting vitality into declining inner-city settings, and expanding lifestyle choices. According to the complex facts that Chinese cities face, it is reasonable to consider TOD as a competitive method in historical city centers. What’s more, the demands of the historical city center regeneration somehow match the common principles and functions of Transit-oriented Development.

<table>
<thead>
<tr>
<th>TOD principle</th>
<th>Demands of Historical city center</th>
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<tbody>
<tr>
<td>Compact and mixed</td>
<td>Shift in function and</td>
</tr>
</tbody>
</table>
There are many possible approaches to the regeneration in historical city center, the theory and practices of both share the similar principle of compact, mixed landuse and friendly neighbor atmosphere. They both suppose to achieve the goal of a sustainable cycle in landuse, land price, human behavior, and quality. The approach on conservation the importance and identity of historical city center enables us to distinguish the problems of Chinese historical cities. The TOD approach in developed countries also enables us to give an answer to those Chinese historical cities that have the problems on regeneration after analysis, give a clear spatial suggestion, and the future view. Therefore, the optimization of these two approaches should be anticipated in the attempts of regeneration in historical city center under the Chinese background to achieve a sustainable result.

6 Bibliography


