Achieving a balanced network

An integrated strategy for a new regional infrastructure, improving the job accessibility and the socio-spatial cohesion.
Colophon

Achieving A Balanced Network:  
An integrated strategy for a new regional infrastructure,  
improving the job accessibility and the socio-spatial cohesion

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1. Motivation

The research tends to concern on the typology of suburban industry area in the contemporary China, which normally presents a monofunctional character, and the problems of the enormous industrial worker group who work in it and face the increasing time consuming commuting problem (the long-time journey results in a monotonous linear movement as home – work – home, and their whole spare life is isolated from any social network), during the fast transformation process towards a regional network in China. It proposed to strategically consider the potentiality from the new wave of Chinese high-speed railway system development as a new local & regional framework, in order to integrate the tackling the above problem with the current Chinese regional development.
The widespread regional development trend as “the networked Mega-City-Region” (Scott, 2001) has changed our cities and our lives dramatically. Regions have replaced cities as new units for global cooperation and competition. The interrelated polycentric region form (Jauregui Fernandez, 1993; Dieleman, 1996; Dieleman and Priemus, 1996; Albrechts, 1998; Dieleman and Faludi, 1998a, 1998b) presents the unprecedented integration between cities in the large scale, but at the same time, has increased the separation (fragmentation) of urban functions in space and time.

The regional network trend has spread to China and been recognized in the Yangtze River Delta and the Pearl River Delta (Hall, 1999; Hall and Pfeiffer, 2000). Some other Chinese cities also experience this kind of transformation.
1.1.1 The Chinese suburban industrial area development: fragmentation from the regional perspective

In Chinese regional network perspective, industry is a huge element of the urban functions which are considered as can be moved out from core cities or the urban centre to peripheries. At the same time, the relocation of industry must accompany with the shift of related industrial jobs, which directly relates to the life of the industrial workers:

Most of them do not have the capacity to change their residence then must suffer a long time consuming job journey, which reduces their opportunity to access to daily facilities and daily social network in their residence.

The new location for industry, is mainly the formal agriculture area in suburban area, which is far from the urban area and with limited functional links and public transportation facilities related to workers’ demands. Therefore, the workers’ demands for daily facilities and social network are also impossible to meet in their job location and during their commuting journey.
Above all, a manifest social-spatial fragmentation arises in suburban industrial areas and the related industrial workers, requiring immediately solution. However, China is experiencing the transformation process of the industrial structure from labour-intensive industry towards technology-intensive industry and service economy, which makes current industry development and industrial area possibly temporary. The new industrial area regeneration project in Shekou, Shenzhen (the first Chinese special economic zone growing from a tiny finishing village into a mega city accommodating 12 million inhabitants in 30 years, starting from an intensive industry development)(Cao, 2010) has manifested that there is the possibility of the industrial area to be transformed into other developments in few decades.

Facing this dynamic change, Chinese government tend to shelve the current local social-spatial fragmentation and focus forward the next stage of development, which means that they tend to ignore the urgent demands from the real users – the industrial workers (40% of the employed population).
In the current global productive chain, China still stands on the lower end, mainly active in manufactory and processing industry featured labour-intensive. The cheap labour is greatest property and the basement of Chinese economy. The industrial workers constitute 40% employed population in the Yangtze River Delta. (Yangtze River Delta economic year book, 2010)

Mostly the workers earn low-income without high-education and high-skill. The social-spatial fragmentation in suburban monofunctional industrial areas and the increasing time consuming commuting problem has impeded their accessibility to social daily network. This problem has further decreased their living quality, increased their living cost, and even limited their opportunity to receive education and skill-training, which poses severe social development stagnation on this huge group.

1.1.2 Workers: could not be excluded.

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The stability of the huge industrial worker group directly relates to the maintenance of investments; also the transformation of industrial structure cannot go well without the evaluation of related social development.

Therefore, the current social-spatial fragmentation cannot be simply seen as a temporary problem which will disappear automatically in future; the feed to the demands of workers can be viewed as a key step in the progress towards the achieved economic transformation, at the same time, generating a more flexible transformation mode with more mix development.
1.2 A new wave: the Chinese high-speed railway system and suburban H.S.T. stations

As another key elements in the networked regional development mode, the large regional infrastructure network development present as a new national high-speed railway system in China.

1.2.1 The Chinese high-speed railway system plan and development: the high investment and a large ambition

In 2008, Chinese government promulgated the national High-Speed Railway System Plan for 2020, including 50,000km of high-speed railway. As the short term target, until the end of 2012, a high-speed railway network including 42 lines of high speed railway (13,000km in total, costs 900billion RMB/110billion EUR) will be finished, running through most important Chinese economic development areas in coastal and inland area.
Considering of the possible complexity of construction in urban area and the possibility to generate future urban expansion, most finished and planned HST stations are located in suburban areas.

The new regional development is structured by the High-Speed Railway system, the in-between area between the main cores has become the destination for the industrial driven suburbanization.
Bertolini (1996) characterized two roles of stations: “nodes of networks, and places in the city”.

“On one hand, stations offer a (potential) connection to several of the material and immaterial flows that create value in the current 'informational' (Castells, 1989) mode of development. Stations are (or may become) important nodes in both transport and non-transport (e.g. business, consumption) networks. The connection to ever denser, faster and further reaching transportation systems, as well as the development there of office complexes and shopping centers are materializations of this global dimension of station locations.

On the other hand, stations identify a 'place', a both permanently and temporarily inhabited area of the city, a dense and diverse conglomeration of uses and forms accumulated through time, that may or may not share in the life of the node. The mixture of housing, small business premises and informal public spaces of the station's neighborhood are an expression of this local dimension. Model transport node.”

1.2.3 The dual role of a station (Bertolini, 1996)
If translating it into my understanding: The station can be a node to generate and integrate different transportation means into a multi-mode infrastructure system as well as to generate a series of infrastructure oriented developments related to large scale perspective; the station can also be a local centrality to facilitate variable groups of local users.

According to the above understanding, it is reasonable to consider the possibility to counteract to the social-spatial fragmentation in suburban industrial area through the on-going Chinese high-speed system development and these suburban H.S.T. station projects.

However, the cases given by Bertolini (1996) to show the evidence in his paper – Utrecht Central Station (NL), King’s Cross Station (UK) and Eurolille Station are still under European content. The former two are already the dense urban centres and the later one is a urban peripheral station project focus in immediate surrounding area. The extreme scale in Chinese suburban area and the different contexts between China and Europe pose the challenge to apply Bertolini’s theory in China.
1.3 Chinese context

1.3.1 The Chinese economic development: Fast and transformation

Chinese economic development cannot be only concluded as fast increasing: By the policy as “reform and opening-up” in the past 30 years, Chinese economic structure has successfully transformed from the formal agriculture-domain into the industry-domain. Now, the industry, mainly manufactory is the pillar of Chinese economy. As my mentioned in the previous part in this section, China is experiencing the new wave of transformation towards high-tech industry, I.C.T. (Information and Communications Technology) and service economy. This transformation needs more supports from the development of social structure (technology and education) and market network, which cannot be finished in short time. It means, in a long period, maintaining the current advantage on manufactory and gradually transforming towards high-tech industry, I.C.T. and service economy will be the two main equal import parts in Chinese economic development.
1.3.2 The Chinese planning system

Chinese government mainly focus on the long-term and macro target – regionalization and high-end development, which means they can activate strong national finance to support a series of large regional infrastructure project.

On the other hand, we appreciate Chinese planning system as an immature system: there is still not so much opportunity of public integration to let the large worker group to claim for themselves a more urban quality of life.
As the physical representation of the Chinese fast economic development—the land of China is also experiencing a large fast process of physical transformation.

A regional structure transformation has emerged as the result of the new industrial structure transformation. It generates new developments as C.B.D. (central business District), high-tech industry parks, high-end real estates and high-end recreation facilities, which Parallels to the continued development of existing production as the peripheral industry, without a consideration of integration and correlation. A real progressive development has not been considered in the regional structure transformation, which stimulates some tensions between above two types of developments and increases the uncertainty in the transformation.

Besides, the current global crisis poses a new challenge by slowing down both the economic development and physical development.

**Case:**

Shekou

the first port related industrial area in Shenzhen, has been planned to be regenerated towards a complex area with conference, business, commerce and living and recreation.

Sources: Shekou regeneration plan, 2010
1.4 Conclusion: the regional research challenge

How to include the suburban industrial area and correlated industry workers into the governmental regional urban development through the consideration of the new opportunity from HST system development under the current dynamic transformation process in China?

How to seize the opportunity?
2. The research on the in-between area in Binhai as an illustration

To make the regional research more specific, I choose a typical site fitting the descriptions in the last chapter as an illustration – a suburban industrial area with the social-spatial fragmentation problem, in the dynamic in-between corridor of the Beijing-Tianjin-Hebei Mega City Region, with a new regional H.S.T. station under construction 4km away. The conclusion and other outputs of this research can be also used to apply to other areas under the similar condition in China.

2.1 Contexts

Beijing-Tianjin-Hebei Region
the third biggest coastal city-region in China, following the Yangtze River Delta and the Pearl River Delta. It is one of the most dynamic economic developing areas in China and Northeast Asia

Area: 183,700 km²
Population: 76,000,000
A dynamic corridor with huge flows of capital, resource, goods and people. It runs through the two core cities--Beijing (the capital) and Tianjin, and the largest port area for the whole region — Binhai (a port economic developing area has only 28 years’ history), facilitated by an high-speed intercity railway (Beijing-Tianjin-Binhai) and inner city metro line (Tianjin-Binhai).
2.2 A planning process towards a regional perspective

Binhai, the gateway linking the region with the world, in the new regional governmental vision, is further highlighted as the junction of the Beijing-Tianjin corridor and the coastal economic belt. The suburban industrial is just beside this extremely dynamic point and the regional corridor.

2.2.1 The regional vision

Binhai, the gateway linking the region with the world, in the new regional governmental vision, is further highlighted as the junction of the Beijing-Tianjin corridor and the coastal economic belt. The suburban industrial is just beside this extremely dynamic point and the regional corridor.
2.2.2 The regional infrastructure development

In the regional high-speed railway system plan, Binhai is also an important hub linking Beijing with the northeast area in China. Two H.S.T. stations will be located in Binhai (like the condition of Den Haag Central Station and Den Haag Holland Spoor Station). Among them, the passing-by station is planned 2.4km away Binhai urban area and 4km away the in-between industrial area. It is possible to be considered as the new opportunity for the west part of in-between area.

Besides, an upgrade project of the existing Tianjin airport is planned in order to ease the existing pressure of Beijing international airport, which can be seen as another opportunity for the east part of the in-between area.

My research site will be the west part of the suburban industrial area near to the H.S.T. station. The conclusion and experience can be also used to indicate to the possible consideration between the east part and the airport upgrade project.
2.3 local Problem

My research site will be the west part of the suburban industrial area near to the H.S.T. station. The conclusion and experience can be also used to indicate to the possible consideration between the east part and the airport upgrade project.
2.3.1 Function

**Function:**
The local pieces of development present a functional fragmentation. More than 80% of the current development is industry and related logistics.

**Social daily network:**
The living function in the suburban in-between area are constituted by new high-end real-estate and medium developments (both in the periphery of the industrial area), the governmental supported workers residences and company owned worker dormitories (only pieces interspersed among the industrial function). Their affiliated limited service facilities form the daily service network in the area, but the distance between them and surrounding area are far.
2.3.2 Mobility

Infrastructure:
The in-between area is concentrated with highways and goods railways, more effective for regional goods transportation than people’s mobility.

Public transportation:
The inner urban metro line (map) is far from the industrial area, with little relation with on the workers’ mobility. The current bus lines are low-effective in the wide scale of the industrial area. Most workers commute everyday by the shuttle bus of each enterprise.
**Local slow mobility:**
Most parts don’t have sufficient cycling and pedestrian lanes. To access the area by cycling and walking is difficult.
2.3.2 Landscape

Surrounding regional landscape

Regional green belts:
The green belts planned in the regional ecology system are not well related to the local functions and users (not designed as a cohesion use belt). Now they have been occupied by the industrial function.
**Isolation green belts:**
There are a certain amount of green belts along the concentrated highway system and railway, but mainly only used as noisy barrier without much contribute to the local daily activities of local users.

**Local daily open space:**
The local open spaces are fragmented and do not help the accessibility to the daily facility network.
2.4 The missing integration in the governmental plan

The planned new regional developments in the suburban area, both the regional H.S.T station and a new high-tech industrial area with a certain large service facilities and high-end real estates, will form the new centrality conditions in local scale. However, in the governmental vision, they are just parallel with the continued development of the old industrial function, without an integrated consideration of the suburban area as a whole.

Sources: http://www.fdc.soufun.com
2.5 The Opportunity: the suburban H.S.T. station project

A Key developing opportunity to the suburban industrial area:
the consolidation of a new centrality with an emphasis on an extended effect of the station project to restructure the extended surrounding area.

The effects will not be only limited in the physical or functional transformation, but also will be presented as a strong developing hierarchy and investment possibility to support the implementation of the possible physical transformation.
2.6 Problem statement

During the fast transformation process towards the development of a regional network in China, the industrial driven suburbanization has led to a manifest local socio-spatial segregation in urban areas. This is cause because the mono-functional suburban industrial area and an increasing time consuming commuting problem of the industrial workers who have residences possibilities far away from their Job. Both facts degraded their living quality and limit their capacity to develop their human capital. It also constrain the regional developing perspective and even the national long-term economic development, because any further transformation (as the new plan) will require large transformation on the current big majority of the worker which are not recognized in the new regional plans.

The new H.S.T. station will be part of a potential centrality node at the regional level but also pose conditions to be a new centrality at the local scale. This can be seen as an opportunity to counteract the negative effects of the regional plan on the local scale, if it facilitates a different multi-mode transport network (able to link regional flows and local places) as well if includes the demand and interests of local actors within the regional development perspectives.
3. Research framework

3. 1 Main research question: the key challenge to the regional development

How to re-structure the suburban spatial development by using the suburban H.S.T. station (suburban regional infrastructure) as a new centrality condition activating a multi-network system (in an area of 106 km²)?

In order to:
- Counteract to the current socio-spatial segregation;
- Integrate the demands from suburban workers (the majority local actors) into the regional development;
- Complement the governmental plan towards a more flexible development mode so to consider the possibility of the area towards a more diverse type of development.
3.2 Theoretical framework:

3.2.1 To define the problem: to recognize the line of problem

- How does a regional network developing perspective cause spatial fragmentation?

As has been set by several geographers and planners, the Networked Mega Region is a new developing model impulse by Globalization forces; and it very much relates to areas developed as mega cities (Scott, 2001; Hall, 2011). The form which characterizes this model is the concentrated decentralization (Marcuse, 2002), where the Node (city or major agglomeration) activate a larger network. This model can also be defined as a polycentric model at a regional scale, where the ideal model is that each Node (city or major agglomeration) correlates its function with other nodes, in a supportive mode, more than in a competitive one (Meijers, Waterhout and Zonneveld, 2007). However, the risk is that this “network tend in any case to cluster its correlated functions, and dismiss the functions that do not subordinate to the major functional characterization, determining possible fragmentation, spatial or social one.

The main networked region are defined in advanced economies (e.g Randstad, the Netherlands), while it is now also a phenomena much observed in fast developing economies, as is the case of China (Friedman, 2005). In this economy, the co-habitation of high services and low-skill manufacturing is a fact which is not considered into the plan for the mega regions, creating dichotomy between the future plans (oriented to a knowledge-based economy) and the current users and inhabitants. This is particularly obvious in the industrial suburbanization (Kotval, Moriarty and Mullin, 2002) that expressed in the area between cores (which acts as the base of the Networked regions) (Sepulveda and Janches, 2009).
What is the relationship between the spatial fragmentation in industrial areas and social exclusion of Industrial workers?

From the observation in the above mention regions, the spatial fragmentation causes the distance between the location of residence areas (mainly informal areas inside urban as city villages, surrounding the core developments) and the location of the clustered industries in the suburban areas between the cores. This phenomenon can be observed in any large cities, almost being a characteristic of them, determining a socio-spatial segregation, due to (global) changes in the distribution of jobs (Guerra, 2005; quoted by Kozak, 2008). This determine an extreme long commuting time, even aggravated by a capillary transports system (mainly private linking residential areas to specific industries) disconnecting the workers even to the public transport system. According to description of Moser (1998) on diminishing the accessibility to services, “this services deficiencies to poor household limit their capacity to mobilize their assets”.

How to reinforce interactions by morphologic strategies to counteracts Fragmentation?

The recognition of the territory as a collective construction (Benjamin and Starr, 1989) could help to recognize the diverse stakeholders’ demands of space in their daily urban systems (Sepulveda, 2010). If those systems are considered into a governance model, as a more cultural-based polycentric strategy, by a multi-scalar approach, the consensual plan which integrates the diverse demands can be defined as a more flexible model for development.
3.2.2 To explore the causality problem towards a solution oriented perspective

-What is the effect of implementing a transport station in the local scale?

According to Bertolini (1996)’s Node-Place model for railway station:

On one hand, the station is a regional node activating a multi‐scalar transportation network, which functions not only to link the station to a regional network but makes the station as a transit point among various local transportation systems. This is possible to say that the introduction of a new station can also be seen as an opportunity to improve and integrate the current local mobility.

On the other hand, the station is also an urban place concentrated with urban functions, a centrality condition generating more and more developments, which potentiates the station area as a new regional centrality to meet the urban facility demands in the immediate surrounding areas of station.

Moreover, the multi‐scalar transportation network bases its meaning as a starting “feeder” of the network for the local scale, more than only in the regional mobility. The resource (the social facilities) can be shared through this whole network (Castells, 1989; Zonneveld, 2003; Schrijnen, 2003). This can be physically expressed and activated as T.O.D. (Transit Oriented Development) mode, which means that the local network can make its routes (and its nodes) integrate with the existing social facilities, and then the nodes in the network also have the possibilities to centralize and generate correlated social facilities developments into local centralities. In this way, the station has the potentiality to generate a multi‐scalar transportation network containing social facilities by recognizing the multi‐scalar network from its origin -- a feeder with flows, people and cargos, etc.
- How this effect can benefit more large surrounding area?

Indeed, as in the answer for the last question, an integrated consideration of a network and T.O.D. strategy has help to enlarge the effect of station development from its immediate surrounding area towards its large surrounding area. At the same time, to the more local scale, it is necessary to recognize the hierarchies within the network, where a sub-centrality correlating systems can appear around the node for local transportation network. According to the practical experience of applying T.O.D. in Asian context the service radius of them can be extended by improving the walking experience and creating a feeling of orientation as arrival (Zhang, 2006). Besides, considering the diversity of the network with the individual slow mobility, the B.O.D. (Bicycle Oriented Development) offers us more choices to reach the sub-centrality from further local places.

The Network City (Castells, 1989; Zonneveld, 2003; Schrijnen, 2003) is understand as a Urban structure, which in its ideal models, all the local areas are integrated into a network system through diverse hierarchies (the involvement and correlations between nodes and cores). These hierarchies of the network and the development directed by T.O.D. strategy, can lead to a better integration on diverse scales, by the recognition of the effects of the networks activated by a nodal points (as is described in this thesis scope). Moreover, the extension of the mobility networks with a correlation of functions also express in a way as a development corridor (an extended centrality). From the understanding of the corridor as an evolutionary and long-term concept considering technological and locational assets and changes( Whebell, 1969; Doxiadis, 1967), the corridor development can function as an strategic form to expand the functions in the networks and also as a way to validate the multi-scalar activation.
-What’s the effect of urban Quality?

For the current fragmented socio-spatial condition on the current local users at the regional scale, as I mentioned in the last question, the consideration of the potentialities from landscape can be used to help to improve the local mobility between local places and sub-centralities -- if the current diverse landscape are considered as key destinations (with functions for leisure or other activities). This public space networked approach can permit the activation and correlations of various activities and integrate various users’ demands into a cohesive spatial form. (Matthew Carmona 2010 and Sepulveda 2009). It can form a kind of long-term vision as the one proposed by of OMA’s plan for Villa Nouvelle Melun Senart (1986), the “void” (the open space system) can be treated as key planning elements to form a backbone with high urban quality, in order to potentiate and lead the future development in a flexible way. This idea can be also supported by Tjallingii (2005)’s theory as “landscape and infrastructure can guide urban development” and corridor development concept I mentioned in the last paragraph from Whebell (1969r) and Doxiadis (1967)’s point of view on corridor development concept -- “corridor as an evolutionary and long-term concept considering technological and locational assets and changes”. That is to say, the landscape can be considered as an active destination or node, activating major urban elements within a functional activated networked region.
-What is the possibility for development by less government fund?

Always the most worry from the government when doing a project (especially a project for weak groups) is how much it will cost governmental fund. Actually, the integration attention of this research itself is already a way to reduce the government cost from the expense for regional infrastructure development and the expense to solve the local problem into the expense for an integrated project. The key investment at Governmental level is at the planning land uses, so the diverse networks related to diverse stakeholder interests can be started via a consensus infrastructure development plan. It also will be a more flexible mode because there is more various areas and group can be integrated. All these will give good diverse value to the potential regional network.

For more local and specific development, making full use of the existing elements and considering the Joint Development and Public-Private Partnership can further help the reduction of governmental refund, make the plan easier accepted by the government.
3.3 Methodology

Main research question:
How to re-structure the suburban spatial development by using the HST station development?

Problem statement:
- increasing time consuming commuting problem
- non-functional industrial area
- uncertainties in planning and development

Chinese context:
- fast economic development and transformation;
- high investment capacity, but lack of integration of local actors;
- uncertainties in planning implementation

Analysis:
- socio-spatial segregation in industrial area
- HSR system development
- Chinese planning system: large investment capacity, low integration of local actors

Opportunity:
The station has a dual role:
A node — activating multi-transportation system; activating belonging (T.O.D.)
A place — offering urban functions (Bertolini)

Approach:
- an effective multi-level transportation network, with public transportation
- HST station as a potential regional centrality
- stops of the public transportation at potential local sub-centralities (T.O.D.)
- resource can be shared through a multi-transportation network
- a station is a local place offering urban functions (Bertolini)
- transport stop can be a local centrality (Castells, Zonneveld & Scrijnen)
- a station is a potential regional node activating a multi-transportation network (Bertolini)
- open space system with high quality linking urban development elements and the variable open space; considering the existing elements and the variable means for development
- need a local slow mobility network as cycling lanes and pedestrian way with qualified and attractive open space;
- open space system with high quality linking urban development
- considering the existing elements and the variable means for development
- considering the existing elements and the variable means for development
- a corridor (HST station) and sub-centralities: considering local actors and industrial workers; considering developing process and result;
- Case: Villa Nouvelle Melun Senart, “void” case; obstacle for development
- Case: Binhai industrial Park, “void” is more certain than built area both in developing process and result;
- Case:�� Nelson Mekan Smart, “void” can generate future development

Theory:
- socio-spatial segregation in industrial area
- HSR system development
- Chinese planning system: large investment capacity, low integration of local actors

Analytical framework

Reflection & recommendation
Key elements of Strategy

- Sub-centrality developments
- A centrality, including the social infrastructure towards workers
- A multi-mode transportation network

Evaluation of governmental vision

- Turn the "void" into the "backbone"
- Buffering zone with mixed functions and flows
- Dual station traffic, car side/car-free side

Design strategy

- Evaluate governmental vision
- Design strategy
- Master Plan Design
- Strategic intervention
- Analysis
- Criteria/Strategy

Design framework

- Design principle
- Design strategy
- Evaluation of governmental vision
- Strategic intervention
- Analysis
- Criteria/Strategy

Mobility network:
- An effective multi-level transportation network
- An effective public transportation
- And local slow mobility network (cycling lanes and pedestrian way) with supportive open space; a centrality (H.S.T. station) and sub-centralities: including social facilities towards industrial workers
- Considering the existing elements and the variable means for development

Urban facilities:
- Insufficient facilities
- Unlink to regional attractions
- No means and occupied green belt
- Fragmented open space

Open space system:
- With high quality linking urban functions local spaces and local users
- Access to region
- Activate and protect daily open space network (supplementary to local slow traffic)

Strategic intervention

- Fast bus system on the super grid, linking most local area
- Possible node to transit to other transportation
- Possible corridor development

Specific site

- Evaluate governmental vision
- Design strategy
- Design framework
- Master Plan Design
- Strategic intervention
- Analysis
- Criteria/Strategy

Approach

- Principle
- Strategy
- Analysis
- Plan
- Design
- Next step

Methodology

- Research question
- Specific site
- Chinese contexts
- Opportunity
- Problem statement
- Trend
- Motivation

Theory

- Case
- Strategic intervention
- Design principle
- Evaluation of governmental vision
- Key elements of Strategy

Criteria

- Sub-centrality developments
- A centrality, including the social infrastructure towards workers
- A multi-mode transportation network

Design principle

- Generating development towards program strip
- Offering social infrastructure towards workers
- Organizing flows of multi-mode transportation
4. Research actions

4.1 Research framework

Main research question

How to re-structure the suburban spatial development by using the H.S.T. station development?

Problem Statement

Demands from industrial workers

-increasing time consuming commuting problem
- monofunctional industrial area

Theory

-a station is a regional node activating a multi-transportation network (Bertolini)
-a station is a local place offering urban functions (Bertolini)
-resource can be shared through a network (Castells, Zonneveld & Scrijnen)
-transit stop can be a local centrality (T.O.D.)

Chinese contexts

Challenge

- fast economic development and transformation;
- high investment capacity, but less integration of local actors;
- uncertain planning implements

Theory/Case

-the normal walking distance (Smin, 400m) can be extend by a good walking experience. (Asian experience of T.O.D., by Zhang)
-cycling can extend the service distance to local centrality. (B.O.D.)

Public-Private Partnership
Case: Shekou (Shenzhen), build workers’ dormitory by collaboration between government and enterprise

Principle

-need a local slow mobility network as cycling lanes and pedestrian way with qualified and attractive open space;

-considering the existing elements and the variable means for development

-open space system with high quality

-mobility network:
- an effective multi-transportation network activating by HST station
- including an effective public transportation
- and local slow mobility network (cycling lanes and pedestrian way) with supportive open space;

-a centrality (H.S.T. station) and sub-centralities: including social facilities towards industrial workers
- considering the existing elements and the variable means for development

open space system:
- with high quality linking urban functions local spaces and local users

Next step

Criteria/Strategy

mobility network:
- an effective multi-transportation network activating by HST station
- including an effective public transportation
- and local slow mobility network (cycling lanes and pedestrian way) with supportive open space;

-a centrality (H.S.T. station) and sub-centralities: including social facilities towards industrial workers
- considering the existing elements and the variable means for development

open space system:
- with high quality linking urban functions local spaces and local users
4.2 Approach

Main research question
How to re-structure the suburban spatial development by using the H.S.T. station development?

Problem Statement
- Increasing time consuming commuting problem
- Monofunctional industrial area

Demands from industrial workers
- Effective and affordable mobility
- Access to social facilities

Theory
- A station is a regional node activating a multi-level transportation network (Bertolini)
- A station is a local place offering urban functions (Bertolini)
- Resource can be shared through a network (Castells, Zonneveld & Scrijnen)
- Transit stop can be a local centrality (T.O.D.)

Approach
Re-structure the suburban spatial development with:
- An effective multi-level transportation network (facilitated with public transportation)
- H.S.T. station as a potential regional centrality
- Stops of the public transportation as potential local sub-centralities

Linking with local areas and the local actors, including landscape, infrastructure into the regional network implementation.
What are the demands from the local industrial workers to improve their living quality? In which level can these demands be integrated into a HST station project?

a. Improving the journey:

Ewing (1995) describe that the accessibility is defined in terms of ease of access to desired activities. Comparing with simplex the time-reduction means in a long distance which needs strong investment, for the workers with limited capacity, it is much more achievable to activate their journey, which means bring them back to public transportation that can provide more possibility for variable activities. Considering their capacities, the transportation mode should be in affordable price, accessible distance and acceptable time.

The network activating by H.S.T. station can be considered to feed this.
b. The complex accessibility to urban facilities in the working area and throughout the commuting process:

Moser (1999) emphasized in her work that Access to social daily network is crucial for the vulnerable group to meet their demands to social facilities and the contact with their community.

Within the monofunctional and separated plots typology and the long commuting time, it is much more possible to combine the needed centrality condition with their daily compulsory route (T.O.D.)—each transfer node in the network activating by the H.S.T. station, creating a centrality and sub-centrality correlation.
The approach

A network, linking the centrality, sub-centralities and the local area

Re-structure the suburban spatial development with:
- an effective multi-level transportation network (facilitated with public transportation)
- H.S.T. station as a potential regional centrality
- stops of the public transportation as potential local centralities

linking with local areas and the local actors, including landscape, infrastructure into the regional network implementation.
### 4.3 Challenge and principle

<table>
<thead>
<tr>
<th>Chinese contexts</th>
<th>Challenge</th>
<th>Theory/ Case</th>
<th>Principle</th>
</tr>
</thead>
<tbody>
<tr>
<td>- fast economic development and transformation;</td>
<td>- whether the network could facilitate stakeholders with variety (time) demands and capacities, in a much broader scale (11km) than Bertolini’s case (1-2km)?</td>
<td>- the normal walking distance (5min, 400m) can be extend by a good walking experience. (Asian experience of T.O.D., by Zhang)</td>
<td>- need a local slow mobility network as cycling lanes and pedestrian way with qualified and attractive open space;</td>
</tr>
<tr>
<td>- high investment capacity, but less integration of local actors;</td>
<td>- how to meet the development demands from various stakeholders with a minimum governmental fund?</td>
<td>- cycling can extend the service distance to local centrality. (B.O.D.)</td>
<td>- considering the existing elements at various scales and the variable means for development</td>
</tr>
<tr>
<td>- uncertain planning implements</td>
<td>- which kind of development mode can give more flexibility to react to the uncertain development phase, both facilitating current and future condition?</td>
<td>Public-Private Partnership</td>
<td>- open space system with high quality, linking urban functions, local spaces and local users</td>
</tr>
<tr>
<td></td>
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<td>Case: Shekou (Shenzhen), build workers’ dormitory by collaboration between government and enterprise</td>
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<td></td>
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<td>Case: Binhai industrial Park, &quot;void&quot; is certain than built area both in developing process and result</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Case: Villa Nouvelle Melun Senart, &quot;void&quot; can generate future development</td>
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<td></td>
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<td>- the public space can include the various users’ demand (Matthew Carmona, Sepulveda)</td>
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<tr>
<td></td>
<td></td>
<td>- landscape and infrastructure can guide urban development (Tjallingii)</td>
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<tr>
<td></td>
<td></td>
<td>- corridor as an evolutionary and long-term concept considering technological and locational assets and changes. (Whebell, Doxiadis)</td>
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</tbody>
</table>
Challenge 1: whether the network could facilitate stakeholders with variety (time) demands and capacities, in a much broader scale (11km) than Bertolini's case (1-2km)?

The network should meet the time demands from variable groups, because of the frequent stops, the traditional T.O.D. radius (if in 1 stop/ per 400m, the time from the H.S.T. station to the new development will be 1 hour 20 min) does not suit to the condition and demands in this area.

If we consider the B.R.T (Bus Rapid Transit) system and extend the service radius of bus stop from 5 min by feet to 5 min by bike (19 min by feet) (B.O.D.), the time can be reduced to 40 min. Then the system will be much more effective for both the users in new developments and the industrial workers.

To help the access in this extend service radius, the cycling and pedestrian friendly environment should be provided (T.O.D.), which can improve the travelling experience and reduce the psychological distance. (Asian experience of T.O.D.)
principle 1: need a local slow mobility network as cycling lanes and pedestrian way with qualified and attractive open space;
Challenge 2: How to meet the demands from various stakeholders with a minimum governmental fund? Considering urban qualities and various developing demands?

The improvement does not need to be done totally by government. The network should help to activate the existing elements and integrate the facilities among variable groups. Besides, Joint Development and P.P.P. (Public-Private Partnership) can be introduced to open variable investment channels.

If we try to understand the case of Shekou from another point of view, encouraging companies to build their dormitories in the industrial area in the beginning can also be a way to set the basic living facilities and create the local centrality condition which can generate the future development, instead of develop living facilities or social housing by the government itself. The experience be can taken into the sub-centrality developments.

**development history of Shekou**

<table>
<thead>
<tr>
<th>Industrial development</th>
<th>Worker dormitory</th>
<th>Service facilities</th>
<th>Night life area</th>
<th>tourism</th>
<th>recreation</th>
<th>Real estate</th>
<th>Regeneration for mix-development</th>
</tr>
</thead>
</table>

1979 2010

In other parts of developments, some (agriculture related) landscape projects can be done by attracting academic or research institutions and association with them; and the temporary vacant lands can be used as short-period collective planting in association with local village cooperation. Public transportation: encouraging small companies and others purchase “commuting card” (covering all the transportation facilities) for employees instead of offering shuttles by themselves, which is also good for ridership and revenue of public transportation.
principle 2: considering the existing elements and the variable means for development
Challegen 3: Which kind of development mode can give more flexibility to react to the uncertain development phase? Both facilitate current and future?

As I declared in the context in the first chapter, the fast developing pace, the on-going transformation process and global crisis make the development phase uncertain. It is the key reason why the government tend to ignore the current problem. Therefore, whether the proposed network can also support and generate a progressive future development become a key criteria for the network.

From the history of the first industrial park in Binhai, we can get a conclusion that the void system -- the road and the open space system is much more certain than the built area no matter during the developing process or until the development was finished.
A hypothesis was given as "if this complex of void/ belts is respected, the qualities of beauty, serenity and of access to urban services – wanted for Melun Senart – are guaranteed, beyond the possible architecture that will eventually emerge in between."
Hypothesis

If the proposed network is not only considered as the transportation means, but also integrated with landscape, especially daily public space system in the local level, can help to improve the current living condition of the workers (majority of the local inhabitant); at the same time, re-qualifying the whole network, can generate more supportive developments, giving a condition for a more flexible development. It will potentiate the local existing development and the current regional plan in their slow down tempo.
principle 3:
-open space system with high quality, linking urban functions, local spaces and local users
### 4.4 Criteria

<table>
<thead>
<tr>
<th>Approach</th>
<th>Principle</th>
<th>Criteria/Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>-an effective multi-level transportation network (facilitated with public transportation)</td>
<td>-need a local slow mobility network as cycling lanes and pedestrian way with qualified and attractive open space;</td>
<td><strong>mobility network:</strong> -an effective multi-level transportation network activating by HST station -including an effective public transportation -and local slow mobility network (cycling lanes and pedestrian way) with supportive open space;</td>
</tr>
<tr>
<td>-H.S.T. station as a potential regional centrality</td>
<td>-considering the existing elements and the variable means for development</td>
<td>a centrality (H.S.T. station) and <strong>sub-centralities:</strong> including social facilities towards industrial workers -considering the existing elements and the variable means for development</td>
</tr>
<tr>
<td>-stops of the public transportation as potential local sub-centralities</td>
<td>-open space system with high quality linking with urban functions, local spaces and local users</td>
<td><strong>open space system:</strong> -with high quality linking urban functions, local spaces and local users</td>
</tr>
</tbody>
</table>
### 4.5 Strategy

-A progressive development of a **network which consists of multi-level transportation modes and supportive attractive open space system in various scales**;

-presenting conditions to activate **functional correlated sub-centralities** (mainly based on the existing clusters of facilities and strategic development program considering P.P.P strategy);

-considering the **centrality** (the new HST station) —with strong development generating capacity, at the same time, **including the social infrastructure towards the demands of the workers**

in order to rebust a social daily network for suburban industrial workers, at the same time potentiate a future flexible regional development.
5. A base master plan
— building up components of a master plan for the study area
5.1 Strategy framework

**Criteria/Strategy**

- **mobility network**: an effective multi-level transportation network activating by HST station
  - including an effective public transportation
  - and local slow mobility network (cycling lanes and pedestrian way) with supportive open space;
  - a centrality (H.S.T. station) and sub-centralities: including social facilities towards industrial workers
    - considering the existing elements and the variable means for development

- **open space system**: with high quality linking urban functions local spaces and local users

**Analysis**

- **mobility network**: insufficient link
  - uneffective and insufficient public transportation
  - insufficient and limited local slow mobility

- **urban facilities**: insufficient facilities

- **open space system**: unlinked to regional attractions
  - no means and occupied green belt
  - fragmented open space

**Strategic intervention**

- **mobility network**: a super grid network linking station and industrial area
  - fast bus system on the super grid, linking most local area
  - possible node to transit to other transportation
  - possible corridor development

- **open space system**: access to region
  - activate and protect
  - daily open space network (supplement to local slow traffic)
5.2 building-up the network

5.2.1 Mobility network

Criteria 1: There should be an effective multi-transportation network activating by the H.S.T. station.

Analysis:
The link between the station area, the industrial area and the new development, is insufficient.
Strategic intervention:
To propose a super-grid network linking station and industrial area.
Criteria 2: An effective public transportation including the industrial workers is needed.

Analysis:
The current public transportation is uneffective and insufficient for this wide area.
**Strategic intervention:**
To propose a fast bus system along the super grid network, linking most local area by extended service radius.
5.2.2 Sub-centrality

Criteria: sub-centralities should include social facilities towards industrial workers.

Analysis:
The existing social facilities are far from each other and insufficient.
Strategic intervention:
Maximizing the role of the existing social facilities, to set stops next to them. Considering the scale, to introduce fast bus system and B.O.D. mode to link most industrial area into the system.
Possible node to transit to other transportation

To still offer the possibility in several stops near the entrances to highway to use shuttles to Tianjin urban area through high-way, but to promote a public shuttle bus system instead of existing companies’ shuttles.
Possible corridor development

Using the effect from the new H.S.T. station project as a new regional development to generate and support the implement of the some crucial new sub-centrality developments.
5.2.3 Open-space system

Criteria: with high quality linking with urban functions and local spaces

Analysis:
The area are near to regional landscape, but now the link between them are weak.
Strategic intervention:
To use several activator projects to link the inner open space system into the large regional landscape system, also leave the accessibility to regional attractions. The projects will be participating farm, camping site, parks on the river/lake banks.
Analysis:
The large green belt in the surrounding area from governmental ecology plan is unattractive, and has been occupied by some development.
Strategic intervention:
To use several activator projects to bring some landscape related program into the green belts in order to give more identity to the green belt from the regional ecology system, at the same time, help to keep the green belt intact from development.
Analysis:
The current inner open-space presents fragmented; on the other hand, there are high percentage of green only functions as traffic isolation.
Strategic intervention:

To complement the current fragmented open spaces into a whole dynamic daily public system by activating the infrastructure isolation green belts for public activities, in order to improve the local slow traffic system linked with each sub-centrality.
5.3 Vision for the network

5.3.1 Structure
5.3.2 function map
5.4 Effects

Effects for the local mobility
The journey is divided into several parts by new destinations -- activities in open space, which improves the commuting experience of industrial workers.
Effects for the regional landscape

The subcentrality and its related local network becomes the gateway to access to regional attractions. The new users' flow will also bring more development possibility to the subcentrality and the whole area.
Effects on the potential development

-Density

low density  medium density  high-density
6. Urban Design of the station area

– the synergetic link between the centrality and network
6.1 Design strategy

6.1.1 Design framework

<table>
<thead>
<tr>
<th>Key elements of Strategy</th>
<th>Design principle</th>
<th>Evaluation of governmental vision</th>
<th>Design strategy</th>
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<tbody>
<tr>
<td>sub-centrality developments</td>
<td>generating development towards program strip</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A centrality, including the social infrastructure towards workers</td>
<td>offering social infrastructure towards workers</td>
<td></td>
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</tr>
<tr>
<td>A multi-mode transportation network</td>
<td>organizing flows of multi-mode transportation</td>
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</tbody>
</table>

- Turn the “void” into the “backbone”
- Buffering zone with mixed functions and flows
- Dual station traffic car side/ car-free side
6.1.2 Design principles from the strategy

From the strategy, the station area development as a developing centrality considering the network link with industry area should --

1. **As a activator for sub-centrality developments**: generate the development towards/along the programme belt.

2. **As a functional centrality**: should organize the mixed function in the station area, especially the daily social facilities related to the workers, considering the accessibility and mixed of flow,

3. **As a node** for multi-level transportation network: should have a convenient transit experience, considering the organization of social facilities during their transfer route.
6.1.3 The evaluation of the governmental vision

The governmental plan for station area and design for station

Source: http://www.bh.gov.cn
As a activator: The planned development is limited in the immediate surrounding area of H.S.T. station, the landscape in the void distance from the railway become a barrier. It cannot generate the development of the program strip.

As a functional centrality: The distance between the station, the commercial street and the lake are huge. It is not a pedestrian friendly scale, which especially does not suit to the industrial workers.

As a node for multi-level transportation: In the station design, the car mobility was much more emphasized than pedestrian (directly entrance on the first level from both sides). Besides, the bus stops are planned in two sides of the station, increasing the transit distance in an isolated environment, away from the commercial area and landscape.
6.1.4 Design strategy

Turn the "void" into the "backbone"

Buffering zone Buffering zone with mixed functions and flows

Dual station traffic car side/ car-free side
Re-activatting the void distance into a qualified progressive development backbone, directly linked with the development of progressive strip, to maximize its role as activator both for station surrounding area and the sub-centrality developments in the industrial area.
Buffering Zone: with social facilities

To create a buffering area between the H.S.T. station, the waterfront and the planned commercial area, with the mix of daily social facilities and multi-transportation transfer facilitates various user groups.

Of course the development of social facilities need to consider the development pace of project, which means that some facilities can be placed in the first phasing project (station and its surrounding), then move to the proper locations after they are done.
Keeping the car bridge in the north square of the station, but to re-organize the public transportation means in south square and create a pedestrian-friendly environment.
6.2 Design

6.2.1 Plan
6.2.2 Overview

- Future developments along the backbone and towards the industrial area.
- Office tower development on the roof.
- Possible roof park to permit recreation and various activity.
- Parking and public function to fulfill the under-railway space.
- Densified developments surrounding the station.
- Station (under construction) and commercial street in the governmental plan.
6.2.3 Birdseye view
6.2.4 "Backbone"

Section through passage

- slope to ground
- stairs to roof
- passage
- bridge to station
- stairs to roof
- slope to ground
- passage

Legend:
- Office
- Yard
- Shop
- Pedestrian way
- Cycling lane
- Road
- Parking
- Public function
- Waterfront
- Lake

Scale:
- 0 20 40m
a. Slope to ground
b. Stairs to the roof
c. Slope to ground
6.2.5 Square

Section of square
north square with
Taxi drop-off
sunken square linking
station, metro and taxi
pick-up
south square
water front
bus station
commercial
street
sunken square
station
commercial street
bus station
metro entrance
shop
commercial street
shop
shop
shop
yard
shop
sunken square
square
tourist information
centre/cafe
tunnel
bus station
metro entrance
shop
commercial street
shop
shop
shop
yard
shop
Access to waterfront
7. Evaluation and Recommendation

-On the design for the station area

1. Compared with the field development mode in the immediate surrounding area, the new development mode along the current infrastructure corridor determines the hierarchy for the station area development, guiding the development along the existing local transportation corridor towards the existing urban developments and the wide industrial area. At the same time, this development mode will offer a way for high density and mix-function development surrounding the station with high flexibility on diverse possible uses under the existing fly-over railway construction condition.

2. Compared with the car dominant transportation mode in the governmental design, the new design integrates various transportation modes, transfer infrastructure, public space and social infrastructure facilities into the station area.

3. Compared with the strict functional division in the governmental vision, the new design presents as a more mix-use area including various social facilities, which can facilitate a mixed flow of people and attract more diverse flows in the future. In this way, more functional flexibility and various other possibilities for the station area development can be achieved.
-On the strategy for the large industrial area

The current situation

1. The whole area, including the new regional development, the existing industrial functions and the potential developing area, will be linked effectively within a multi-transportation network. The commuting time for the workers and inhabitants will be shorter than the current situation.

2. Compared with the mono-functional and isolated character, a multi-scalar social facilities network will be formed. Social facilities will be accessed both at the local area and during the each part of the commuting journey.

3. The living pressure for industrial workers will decline; therefore the area will be more attractive for work and new investment because of its livability.

4. Compared with the current industrial development, the area can grow in a more flexible way and with diverse development possibilities, with high quality in each development phase.

5. Compared with the current separation mode for each development clusters, the integrated consideration in the proposed strategy not only improve the mobility and social infrastructure accessibility at the large industrial area; but also allow more and various flows to the station area, making more transportation infrastructure and social facilities integrated into the station development as a whole, as a result, creating more possibility and flexibility for the station area development.

The proposed strategy
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