Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information	
Name	Fran Yanjie Shen
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Studio		
Name / Theme	Planning Complex Cities	
Main mentor	Marcin Dabrowski	[spatial planning and strategy]
Second mentor	Birgit Hausleitner	[urban design]
Argumentation of choice of the studio	The starting point is the Q4 urban and infrastructure re-development game, in which I acted as the land department, together in close cooperation with planning department and economic affairs, we represented and carried out development scheme in achieving PPP-based co-shared development goal. In the process, I as an international student deeply felt the difference between the Chinese urban re-development system and the counterpart in the Netherlands and hence planned to further investigate in this during my thesis. As China is currently facing the transition from rapid real estate development into the era of inventory renewal, every move in the re-development process needs to be more considerate and comprehensive in aspects such as collaborative model, policymaking, financialization and monetary incentive setting. In the urbanism track, normally we use mapping for spatial analysis and data visualization to explore an optimized and more integrated spatial solution. This is, however, sometimes difficult to unveil the sophistication in stakeholder dynamic and managerial structure. As a result, traditional urbanism research method may lack in the practicality. For the research topic, I want to explore the hidden problem of the unequal development of Yangtze River Delta despite of its glamorous overall economic achievement. In the northern part of Anhui province, the 6 cities have almost the lowest GDP per capita among all 42 prefecture-level cities in YRD. Meanwhile, huge population outflow is happening over decades within the area. The further development of core YRD is even attracting more to leave their hometown. Rural dilution thus leads to lack of investment attention and public service which puts the area into a vicious cycle of downward development. That is why I want to join studio Planning Complex Cities and learn to adopt a multi-layer approach in terms of city planning and management. In the studio, I can explore not only cross-scale spatial analysis, planning and design, but also social and economic aspects which are in particular important to my project.	

Graduation project	
Title of the graduation project	Re-defining Periphery, Development of North Anhui Based on Agriculture-Oriented Circularity Transition
Goal	
Location:	North Anhui Province with a focus on Fuyang City
The posed problem,	[Problem Statement] North Anhui area (Chinese: 皖北) is located in the north-west peripheral area of Yangtze River Delta region with Shanghai as the leading city, leaning east on Jiangsu, south on southern Anhui, west on Henan, and north on Shandong. The terrain is dominated by plains, with the vast Huabei Plain, in a strategic location for south to north and east to west. North Anhui includes Suzhou (Chinese: 宿州), Huaibei (Chinese:淮北), Bengbu (Chinese:蚌埠), Fuyang (Chinese:阜阳), Huainan(Chinese:淮南), Bozhou (Chinese:亳州) six cities under the jurisdiction of the province. RANKED BOTTOM IN GDP PER CAPITA Despite the rapid growth and incredible development achievement of the Yangtze River Delta, there is severe gap and imbalance in terms of current development status and growth rate among all YRD cities. The 6 cities in north Anhui provinces have the lowest GDP per capita among all 41 cities in the YRD with a largest difference with the highest city of almost 5 times. Despite the GDP total amount, breaking down the GDP by three sectors, it is also noticeable that the primary sector take-up is relatively high. It is due to that North Anhui is appointed strategically by the central government as the crop production base for the entire country. The secondary sector is relatively low in share, and mostly focusing on low value-add and labor-intensive industries. LARGEST POPULATION OUTFLOW North Anhui also undergoes large scale population outflow. Anhui is one of the highest populated provinces with a large proportion of migrant population outflow into other regions for work and living. In 2021, Anhui had a resident population of 61 million and a registered population of 71 million, with an overall outflow of 10 million. Top three migration destination for Anhui people is the other two provinces and the city in the Yangtze River Delta. For all cities in north Anhui, population outflow takes up around 20% of the *Huji* population. While the core area enjoying the benefit of abundant and young labor force, this leads towards severe rural dilution. Thousands of houses being empty, leaving the old and toddlers behind. Scarce population cannot gain enough attention from the government and results in the lack of public service in rural area as a vicious cycle. If there are no more people, how can we develop the area? STAGNATION OF THE FORMATION OF URBAN AGGLOMERATION

	In China, urban agglomeration is a national plan that aims to promote regional development based on leading cities. The ideal form of urban agglomeration may be city regions, including megacities with surrounding smaller cities in the processes of globalization and centralization (Hall and Pain 2006). Two relevant processes of region-building exist in the YRD: the top-down process initiated by the central government and the bottom-up process created through cooperation between local governments. the institutionalization of regional governance has been slow and is still under-developed (Li & Wu, 2017). To further elaborate, the Chinese top-down hierarchical administrative system inherited from the socialist period makes horizontal connections rather weak. What is worse, the administrative decentralization reforms inaugurated since 1978 exacerbate horizontal economic relations as a result of localization and territorial competition. Through there is currently profound and successful border region development between Shanghai municipality and the city of Kunshan, the development of this inter-jurisdictional partnership is not region-wide governance seeking collective actions in relation to shared problems such as a fragmented economy, cutthroat competition, environmental degradation and the like. Strong inter-city connection and even collaboration has already been realized and generating huge economic development growth in core YRD area formed by Shanghai, Nanjing, Suzhou and Hangzhou and spread over to north Jiangsu and south Zhejiang inner land. However, in Anhui province, Hefei, the capital city of Anhui Province, does not perform as a regional development pole forming mutual giving-gaining with surrounding cities but purely act as an absorber taking away young talents from the surrounding and policy assistance from higher level government. Meanwhile, North Anhui has not been part of the Yangtze River Delta Urban Agglomeration until 2019 when national government revise the border of YRD and was questioned by the public. Typical opinions included that North Anhui was too poor and would drag back the development of the entire region. National and provincial government have had certain attempts to alleviate north Anhui such as Pairing City Project and building mobility infrastructures. Nevertheless, all these attempts seem to fail to bring north Anhui onto the development fast lane. 5 cities in the north Anhui are part of Xuzhou agglomeration which is not yet well formed. The stagnation of Xuzhou agglomeration is due to the lack of city competitiveness of Xuzhou as the leading city. In 2017, the State Council clarified Xuzhou as the central city of Huaihai economic region, and the provincial government took the construction of Xuzhou as the central city of Huaihai economic zone as an independent segment of the province's important functional area and implemented a series of supporting policies to accelerate the construction of Xuzhou's central city. 2021, the National Development and Reform Commission clarified Xuzhou as the provincial deputy central city, which accelerated the construction of Xuzhou as a "double central city "This has injected new momentum. From the perspective of the development stage, Xuzhou central city is still in the rapid growth period, showing the coexistence of agglomeration and diffusion effects

	and roughly equal power, especially there are outstanding problems such as low city level and insufficient function, resulting in limited radiation-driven effect on the surrounding areas, and it is urgent to do better and stronger. On the other hand, since the concept of Xuzhou metropolitan area was proposed and the implementation plan was prepared at the beginning of this century, its construction has achieved certain results, but the overall development level is not high, and the key areas of metropolitan area integration have not achieved fundamental breakthroughs. It is still in the formative stage of cultivation, showing that the central city has formed relative advantages, the circle area has begun to expand, and the peripheral cities have gradually taken shape, while there are cities in the circle area that do not have a close division of labor and collaboration, a low level of co-location, and a low level of urbanization. At the same time, there are many problems, such as the low level of co-location, the unsound mechanism of cooperative development, etc., which urgently need to accelerate the cultivation and development. CONCLUSION In conclusion, north Anhui area being the most underdeveloped peripheral area in Yangtze River Delta, facing large population outflow and severe rural dilution. Agriculture-based economy with low value-add industry and lack of innovative capability is further restraining the development possibility of the area. Furthermore, current urban agglomeration policy and development scheme seem not to work for the integration of north Anhui into the overall development of Yangtze River Delta which calls for a new regional integration scheme from truly understanding the potential and strength of north Anhui and its position not only in geography but also in the urban agglomeration as city network.
research questions and	[Research Question] **Main research question** Facing the dual inequality of urban-rural and core-periphery, how can agriculture-oriented collaborative regional industry value chain steer the sustainable development of north Anhui 6 cities? **Sub research question 1** What resources and potential do **north Anhui cities agriculture and related industry** have in line with the need of the **regional** network in the process of decarbonization? **Sub research question 2** What spatial planning and governance is needed to build up and secure an efficient **inter-city** collaboration? **Sub research question 3** What spatial and social design can exploit the endogenous potential in **north Anhui**?
design assignment in which these result.	[Design Assignment] This thesis aims to identify the hidden reason of the inequality development of YRD and the poverty situation of north Anhui, the periphery of YRD, and to investigate the industrial circular transition

	opportunity of the YRD urban agglomeration from both market and policy guidance aspects, lastly come up a spatial planning for the development scheme in which certain location, logistic connectivity and policy will guide towards a sustainable, self-sustaining development for the case study area. The spatial design is going to be carried out in a cross-scale approach, from macro regional scale as in the regional value chain spatial configuration, the meso scale of case study area and the micro scalee of specific pilot projects. Among which the design of the case study area, namely the 6 cities in north Anhui area, will be of the most importance and content. Also, the project will put effort onto the social design, namely focusing on feasibility of the planning and fair redistribution of the development result through governance, i.e. policy, financialization, job education of pre-core related industry workers.

Process

Method description

Sub research question 1

What resources and potential do **north Anhui cities as secondary cities** have in align with the need of the **regional** network?

Scale

regional, city level

Question definition

Network is a collaboration type of higher connectiveness, in which each actor mutually contributes and gains in return from the collaboration. To actively join the network, north Anhui cities need to identify their own strength and resources. Secondary cities, though previously neglected in regional study and planning, actually can contribute uniquely to building towards an integrated region.

Methods to be applied

Mapping
Case study (history and spatial impact of big events)

Resource and material

case study
National Statistics Bureau of China and local government*: Annual Economic Development Report*
Land-use plans
Baidu map POI
News articles and online platform
development scheme

Research objectives

The objectives are two parts: first is to identify what kind of industrial landscape will take place in the future in YRD, secondly is to determine resources and development potential of north Anhui cities in align with the industrial upgrade. Determine also the role of secondary cities in regional development.

Expected outcomes

City specialization industry and part in value chain
Potential location of industrial clustering

Sub research question 2
What spatial planning and governance is needed to build up and secure an efficient **inter-city** collaboration?

Scale
regional

Question definition
City collaboration can naturally form but could be more stable and stronger through schematic design and governance implementation.

Methods to be applied
Mapping
Stakeholder analysis
Policy analysis

Resource and material
Baidu map POI
development scheme
stakeholder interview
field trip

Research objectives
Based on existing industrial clustering location and the demand of industrial upgrade, select location for newly built, renovation or scaling up. Design governance to engage stakeholders actively on board for the implementation feasibility.

Expected outcomes
Infrastructure planning (based on reality, i.e., station adding suggestion, not totally new proposal)
Clustering location choice
Stakeholder engagement proposal
Policy suggestion (NATO)

Sub research question 3
What spatial and social design can exploit the endogenous potential in **north Anhui**?

Scale
city level, street block level

Question definition
For the development can be sustainable, north Anhui cities need certain spatial and social schematic design to attract and retain talents and offer better living environment for local people.

Methods to be applied
Mapping
Field trip
Research by design

Resource and material
Land-use plans
Baidu map POI
development scheme
field trip photograph and sketches

Research objectives

Through field trip and desktop research, identify building cluster typology and their potential for the future usage. Design spatial outcome based on planning strategy. Use the outcome to double check the strategy and make amendment if needed.

Expected outcomes
Urban design of several pilot projects

Literature and general practical preference

(Agriculture-side) Regional Value Chain integration

1. Understanding circular economy spatially and circular economy in China

Circular Economy has not been adopted by both planning academia and practical governance from industrial ecology study until recent decades starting in China and west European countries. The understanding, definition, and application hence differ world-wide. Commonly acknowledged is the five principles of circular economy as following five points: circular, slowing down, less materials, substitution and more local:
1) A circular flows of materials and energy,
2) A slowing down of those flows to keep materials and energy as long as possible in use at the highest value possible,
3) A reduction of the amount of materials and energy used,
4) A substitution of non-sustainable materials by sustainable materials, and
5) A geographical concentration of a circular consumption-production system.

Cities and regions are important for circular economy. Firstly, cities are biggest contributors to greenhouse gas emission. Additionally, they correspond more to relevant experimentation and implementation of policies and solutions and already have in place a broad portfolio of policies. Lastly is because sub-national authorities such as Yangtze Delta Region in governance are more 'on the ground' and understand local condition better.

Circular economy is also one of the driving powers in pushing forward China's economic development to the next step. China is among the first countries setting up national-level strategy and legislation about circular economy. Compared to circular economy transition in Europe which is a consumption-based society (Zhou, 2020), circular economy in China, where economic development still largely rely on industrialization and urbanization, aims more at having a holistic approach to solve environmental and social problems together with economic development.

Practicing circular economy in China has its administration advantage in implementation. According to expert interview with Yang from PricewaterhouseCoopers China team of sustainable urban, municipality governments in China has both intention and execution capability including funding, policy making and governance in circular economy transition.

However, what tends to be overlooked in existing CE policies and theories are spatial questions. Hence, I also introduce two more concepts, which are more and longer studied, as compliments with additional theoretical support in relationship between economic development and space and between governance and space: industrial symbiosis and regional industry chain (integration).

2. Industrial symbiosis

Industrial symbiosis, as part of the emerging field of industrial ecology, demands resolute attention to the flow of materials and energy through local and regional economies. Industrial symbiosis engages traditionally separate industries in a collective approach to competitive advantage involving physical exchange of materials, energy, water, and/or by-products. The keys to industrial symbiosis are **collaboration** and the **synergistic possibilities offered by geographic proximity** (Chertew, 2000).

3. Regional industry chain integration

The interdependence of regional trade and production networks has important implications for national prosperity, regional stability and the internationalization of production. The locational interdependence of developed and less-developed countries across the region leverages on the **heterogeneity of location-specific advantages within the region** (Suder et al., 2015).

4. City Collaboration the Next Stage in City Development

Starting from this point can we now seek strategies for north Anhui 6 cities. However, we have to admit that there are clearly real limits to the financial, intellectual and governmental resources that any city can deploy to try and compete more effectively by enhancing its asset stock. Hence Collaboration emerges as a potential mechanism through which cities can share their resources, physical assets and policy skills so that together they can enhance their combined position in the global economy (Docherty et al., 2007). For cities in north Anhui, which by each of themselves or even as a total, the resource and capability will still not be enough to generate development potential. Competing with core area in Yangtze River Delta, all these shining big cities like Shanghai, or even capital city of Anhui – Hefei, they won't stand a chance. The foreseeable future is continuous loss of youngsters and investment, dilution of village, and eventually the shrinkage of the cities. Hence, city collaboration could be a proper and promising way for area like north Anhui to take a shot.

To build city collaboration is to actively encourage the formation of an urban 'eco-system': namely how cities can regain or extent their roles as major service centers. Collaboration is the 'exchange of information, altering activities, sharing resources and enhancing the capacity of another for mutual benefit and to achieve a common purpose' (Himmelman, 1996). Yangtze River Delta core area, based on these criteria, is of cooperation to collaboration level. While YRD as total is now at coordination level while north Anhui region is at networking or even lower intensity of collaboration.

Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?

Planning Complex Cities graduations investigate planning schemes, governance arrangements, and civic engagement in regions and urban areas, how these influence the transformation of spatial structures, and how they can be enhanced to achieve more sustainable and just socio-spatial outcomes. The main focus of the studio is on trans- disciplinary approaches that integrate knowledge from the fields of design, planning, the political sciences, and geography.

My graduation project is to unveil the mechanism leading towards the poverty situation in north Anhui area, the periphery of YRD. It is a study from regional level all the way to village and rural settlements and will always try to analyze the spatial configuration in a cross-scale mindset, from region to block. We can say that it is mostly a planning problem under the very top-down and all-planned governance system in China. However, to understand the question cannot be achieved by only from planning perspective, but a combinate work of regional economy, migration study and policy study. Further, to crack down the problem, it thus is also not a work just of planning and design but a complex work with assistance from governance arrangement, ecology, and market. In this sense, my project matches the aim of the studio in study object's scale, study approach and methodology.

Thus, the project can only be fully executed and guided under the **track of urbanism**, which is about everything spatial, and with space as the core, the mechanism behind and further non-spatial impact they could generate.

2. What is the relevance of your graduation work in the larger social, professional and scientific framework.

My graduation work focuses on regional inequality and the development of the YRD periphery, typical agriculture-based, poor area with large population outflow. It is a story about a typical area and population representing the 600 million farmers in China who are unequally treated compared to its urban population. It is about city losing its competitiveness and losing younger generation to big cities. It is about diluted rural area, empty houses, unwell distributed farmland. Other than spatial issues, it is about an institutional deprived group of people, working hard, but having little security of income and public service. So it is not just the story of north Anhui, but the farmers in China. Through the study, the strategy for north Anhui, can be strategy for a hopefully 600 million. To find a way, re-balance the relationship between urban and rural, periphery and region. I sincerely believe this has a profound social impact for China and other regions facing similar issues.

In terms of professional and scientific framework, it situates itself in filling the gap between circular economy transition and its spatial impact in the context of China's urban agglomeration, focusing on regional integration and poverty alleviation in particular. And it will mainly be done by introducing the concept of regional industrial value chain and agri-industrial symbiosis, which are both originally from the field of industrial ecology and given emphasis on the role of space in the evolving process while being studied by urbanists. Meanwhile, the graduation project will challenge the existing planning principles in China, a way of top-down and "game of color-filling". Instead, the project will find a way to truly integrate the endogenous potential of the local and embed it into the of region.

Appendix. Problem Field

The research approach towards solving the development inequality of YRD lays mainly in two aspects: urban rural dichotomy of China's urbanization process and core-periphery issue of regional development. The north Anhui development problem lays in the overlapping area of the two major problems. To achieve the goal, attention must be paid to both of two problems and find the greatest common divisor. Meanwhile, the project will look at the problem through the scope of secondary cities.

1. Urban rural dichotomy: imbalance between urban and rural

Urban rural dichotomy is the biggest feature when describing the rapid urbanization process in China over the past 40 years and it is also one of the key issues marking the underdeveloped reality of the case study area. There is huge income gap between the urban and rural population, as in the rural population have only one fifth of the urban counterpart's annual income. There is also huge gap in terms of individual development opportunity such as access to high-quality education, healthcare which are normally restrained in cities and further induce people to migrate into cities from countryside. To understand the mechanism leading towards the situation, we first need to look into land ownership system and Hukou system (residence registration system) in China.

LAND OWNERSHIP SYSTEM:

[urban land transactable, rural land not]

In ancient time, Chinese people were categorized into four categories in hierarchy: scholar/governor, farmer, workers, and businessperson. This recognition of the importance and social status of agriculture/farmers remained the same even early stage of the new China. In ancient China, land belonged to landlords. The peasants rented the land of the landlords and paid rents and performed corvée work. This system inevitably led to excessive annexation of land and the increasing concentration of land in the hands of a few landowners, resulting in an extremely unequal distribution of the means of production.

After the founding of New China, the Communist Party of China led the nation in implementing agrarian reform, abolishing the feudal and exploitative land ownership system of the landlord class and realizing "land for the cultivator", as in the land was owned by all people. With the completion of the socialist reform, China adopted the socialist public ownership system, and **rural land** was collectively owned and operated by village as entity, which played an active role in improving the infrastructure conditions of agricultural production, promoting agricultural science and technology, and increasing the original accumulation of industrialization.

The industrialization and reform of opening-up then further attracted people to move to cities. The huge demand of urbanization urged the reform of land transaction legislation, allowing urban land can be "purchased/rented" at a price with tenancy of 50 or 70 years and can be transformed into land use type as commercial, retail, industrial production and so on. In the meantime, rural land cannot be transacted or transformed in land-use. This limited the function and hence the production of rural area.

HUJI SYSTEM

[you get public service only from the municipality where you register in]

Huji (Chinese: 户籍) is a system of household registration used in mainland China. A household registration record officially identifies a person as a permanent resident of an area. It is connected to social programs provided by the government, which assigns benefits based on agricultural and non-agricultural residency status (often referred to as rural and urban). It has been the source of much inequality over the decades since the establishment of the People's Republic of China in 1949, as urban residents received benefits that ranged from retirement pension to education to health care, while rural citizens were often left to fend for themselves. In recent years, the central government has begun to reform the system in response to protests and a changing economic system, while some Western experts question whether these changes have been of substance.

SUMMARY

The land ownership system together with Huji system constrain farmers within rural areas. Lack of service like job education and job fair make them even harder to have a better life. Farmers in underdeveloped rural areas like north Anhui is a typical case. With very low income and later the pension being only ¥200 ($35) per month or even no pension at all, we can say that rural population are the one who bears the stability of the country while undergoing the most severe unequal treatment.

2. The Neglected periphery: imbalance between core and periphery

The Core and Periphery model was developed in 1963 by John Friedmann, and it describes spatially how economic, political, and cultural authority is spread out in core and periphery regions. The Core-Periphery model works on many scales, from towns and cities to a global scale.

In China, the city region has emerged as an important form of regional development and governance. However, the dynamics of spatial inequality in city regions are misunderstood. Qin (2021) examines the Yangtze River Delta (YRD) to determine the spatiotemporal evolution of regional inequality across prefecture-level municipalities from 1990 to 2018. It finds that regional inequality has steadily increased since the 1990s but has declined somewhat in recent years. This is associated with faster growth and higher upward mobility of central regions in the early reform period and increases in the upward mobility of the periphery in recent years. The gradient-distance curve of the Shanghai-centered economy sharpened and then flattened, indicating the polarization of growth in the core regions, followed by the diffusion of development and improved regional integration.

However, the core-periphery remains stronger within provinces between provincial capitals and other regions. Despite regional integration and peripheral development, the problem of spatial exclusion and core-periphery structures persists. More attention needs to be given to the core-periphery relationship and the development of peripheral regions to promote regional integration and reduce spatial polarization.

3. Secondary cities in China

Secondary cities, or second-tier cities, are defined in the European context as non-capital cities, mostly medium-sized, “whose economic and social performance is sufficiently important to affect the potential performance of the national economy” (ESPON/SGPTD, 2012, p. 3). For the research

purpose, the project uses the term “secondary cities” more generally and as academic term addressing not just second-tier cities (30 in total) but overall prefecture-level cities (337) in China.

Secondary cities are often neglected in regional study and planning. And second-tier cities face persistent disadvantages in comparison to first-tier cities. From the regional planning or urban agglomeration scheme of YRD or GBA, secondary cities are usually treated or appointed as supporter or leisure destination regardless of its intrinsic potential.

The size of these secondary cities in China can usually exceed a scale of 2-3 million people. The development possibility and strength embedded in the scale of city is too important to neglect or looked as affiliation. Several recent policy reports stress the need to invest in second-tier cities to rebalance territorial development and improve the national economic performance. With its geographical adjacency with big cities while relatively lower land price, secondary cities play important role in regional development if not more.

Secondary cities also play an important role as localized urbanization node absorbing migrants from surrounding countryside. This offers people a context with similar culture and shorter commuting distance. Yet due to the neglection of higher-level government, secondary cities do not receive as high-quality policy, public service assistance and economic development opportunities as big cities such as Beijing and Shanghai. These cities are now facing the dual pressure of population pressure and economic stagnation.

4. Carbon neutrality transition

On September 22, 2020, President Xi Jinping announced at the United Nations General Assembly that "China will strive to achieve carbon peaking by 2030 and carbon neutrality by 2060 (Note 1)." As the world's largest emitter of carbon dioxide, this demonstration of China's strong commitment to decarbonization represents an important step forward in international cooperation on global warming.

Achieving carbon peaking and carbon neutrality is a broad and profound economic and social systemic change, and regional integrated development is one of the important ways to achieve the vision of carbon neutrality. As one of the regions with the most dynamic economy, the highest degree of openness and the strongest innovation capacity, the Yangtze River Delta region has gradually expanded its regional cooperation from economic cooperation at its initial establishment to a full range of cooperation covering ecology, science and technology under a sound institutional foundation and mature operation mechanism.

For north Anhui area, one of the key pillar industries is coal mining and processing. Decarbonization will certainly affect these industries and its related workers. How to properly utilize the brownfield, how can coal industry workers find new jobs are all among the challenges facing north Anhui in the next step of actual implementation of decarbonization.