

Goldsmiths College, University of London

**Power Politics and Infrastructure Participation:
Electricity Contestation and Urbanisation in a Chinese
Touristic Town**

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Philosophy in Cultural Studies, September 2019**

Declaration

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Abstract

The aim of this thesis is to investigate the politico-economic concerns manifest in the form of problematic infrastructure and political action functioning through the everyday use of electrical infrastructure. It takes the precarious electricity infrastructure and the puzzle of its upgrading in a Chinese tourist site, Huangyao Ancient Town, as the research case. As the focal point of this thesis, infrastructure is understood as a socio-technical system. It is not merely about physical objects, but also a physical articulation of the uneven distribution of power and the struggles for it. Emphasising the heterogeneous nature of a socio-technical system, infrastructure is viewed as a terrain preserved in the meeting and contesting of various actors. It provides a view of the contingent aspects of infrastructure which facilitate the contestation and interaction of users with technical objects. Drawing on ethnographic data and archival records collected from fieldwork between 2015 and 2018, this thesis creates an infrastructural life-history as a research method for investigating how human and non-human actors inform and shape an infrastructural trajectory. This thesis first argues that the disruption of the electricity supply and the obstacles to its upgrading originate from the exclusion of the local inhabitants and local government during the process of Huangyao's urbanisation and tourism development. It then analyses the disputes over the electricity upgrade, leading to a situation of non-communication, which explain why the problems of electricity infrastructure are harder to solve in certain politico-economic contexts. As a result, additional infrastructural devices are adopted by individual users to boost electricity when unstable infrastructural conditions are normalized in everyday life. Such action through everyday electricity use produces an infrastructural space to change the current situation and forms a kind of participation through infrastructure. This thesis concludes that infrastructure can give a voice to a less visible and non-traditional infrastructural public: a terrain where politico-economic concerns are manifest and negotiated through everyday experience.

Abbreviations

CEC	Chinese Electricity Council
CPC	Communist Party of China
FHCT	Famous Historical and Cultural Town
FYP	Five-Year Plans
GHTIG	Guangxi Hezhou Tourism Industry Group Co., LTD
HATC	Huangyao Ancient Town Council for the Promotion of Economy and Culture
HCG	Hezhou City Government
HCPC	Hezhou City Party Committee
HCTL	Huangyao Ancient Town Cultural Tourism Ltd.
HSC	Huangyao Street Committee
HTG	Huangyao Town Government
HTIMC	Guangxi Huangyao Ancient Town Tourism Culture Industry Area Management Committee
SAA	Huangyao Ancient Town Scenic Area Administration
SPCC	State Power Corporation of China
TAPS	Town Administration of Power Supply
ZCG	Zhaoping County Government
ZCPC	Zhaoping County Party Committee
ZWEC	Zhaoping Water Resources & Electric Power Co., Ltd

Glossary

Notes on Romanisation of Chinese terms: this thesis follows pinyin system to Romanise Chinese terms and characters. When referring to a term originally in Chinese, I present its English translation first and then introduce its original spelling in Chinese together with its pinyin representation. Chinese characters and pinyin signals are put in a bracket, in the style as follows: “English translation (Chinese characters; pinyin signals).” Here, in this glossary, these terms are listed in a different way for convenience: Pinyin signals are put at the beginning to enable the alphabetical ordering, and they are followed by Chinese Characters and then English translations.

Bishan Fengnianji 碧山丰年祭: Bishan Harvestival, referring to the “Festival of Harvest”

Bishan Jihua 碧山计划: Bishan Project

Changshou Zhi Xiang 长寿之乡: Hometown of Longevity

Dajiankang Chanye 大健康产业: Big Health Industry

Da Po Zai 大婆仔: the son of the official wife

Guli Yongdian 鼓励用电: encouraged electricity consumption

Guojia Xibu Guozhai Zhuanxiang Buzhu Zijin 国家西部国债专项补助资金: State National Debt Special Subsidies for the West

Guzhen 古镇: Ancient Town

Huangyao Gongshe 黄姚公社: Huangyao Commune

Huangyaojie Cun 黄姚街村: Huangyao Street Village

Jiating Lianchan Chengbao Zerenzhi 家庭联产承包责任制: the Household Contract Responsibility System

Jingguan Dadao 景观大道: Huangyao Landscape Avenue

Jiu Gong Ba Gua 九宫八卦: Eight Trigrams and the Nine Palaces

Juzhong Raoluan Gonggong Zhian Zui 聚众扰乱公共治安罪: gathering people together and disrupting public order

Kezhan 客栈: guesthouses

Kongxincun 空心村: hollow villages

Lvse Gazhan 绿色发展: Green Development, or ECO Development

Lvse Jueqi 绿色崛起: Rise of Green strategy

Lvshui Qingshan Jiushi Jinshan Yinshan 绿水青山就是金山银山: clear waters and lush mountains are the gold and silver mines

Lvyou Gongsu 旅游公司: Tourism Company

Nongdian 农电: Rural Electricity

Nongdian gaige 农电改革: Rural Electricity Reform

Renmin Ribao 人民日报: People's Daily

San Dian Ban 三电办: Three Power Office

San Tong Yi Ping 三通一平: the infrastructure construction, including the access to transportation, water supply, power, supplies (sometimes also to telecommunication, coal gas, drainage, and cable TV), as well as natural land consolidation

Shanshui You Xiangfeng 山水有相逢: Mountain and water has a chance to meet

Shehui Zhuyi Xinnongcun Jianshe 社会主义新农村建设: New Socialist Countryside Construction

Shi Dati, Gu Daju 识大体，顾大局: Recognize the general interest, and consider the overall situation

Simadi 司马第: Sima Mansion

Tuopin 脱贫: alleviation of poverty

Wandao Chaoche 弯道超车: corner overtaking

Yao Xiang Fu, Xian Xiu Lu 要想富，先修路: if you want to get rich, build a road

Yi Dian Yang Dian 以电养电: letting the income from electricity support electricity expenditure

Yi Lvyou Daidong Xiaochengzhen Jianshe 以旅游带动小城镇建设: Develop the Construction of Jihua Small Towns by Tourism

Yongdian 计划用电: planned consumption of electric power

Zhenqu 镇区: construction area

Zhen Guihuaqu 镇规划区: town planning area

Zhengdi 征地: land acquisition

Zhongguo Lishi Wenhua Mingzhen 中国历史文化名镇: *China's Historical and Cultural Towns*

Ziji Bandian Ziji Yong 自己办电自己用: using self-generated electricity

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Chapter 1 Introduction

1.1. Living in the Countryside: More Than a New Fashion

It has been increasingly trendy in recent years for urban residents in China to move to the countryside. Being tired of the urban way of life, these people are deeply attracted by its rural alternative, which they believe embodies primitive nature, traditional culture and everyday customs and rituals. When they find a home in the countryside, these “urban-rural migrants”¹ try to make their imagined rural lives in such varied ways as building houses, farming and setting up small businesses. These nostalgic activities have induced profound social and spatial effects, because they have turned the local (and idyllic) landscape into a new frontier of China’s great urban transformation. In this thesis, I want to explore the logic and mechanisms underlying this new fashion by focusing on the puzzle and politics of infrastructure disruption in rural tourism development. But before I embark on my research questions and framework, I want to introduce a concrete case of this new fashion, which shows vividly its extent and effects in urbanising China.

Ou Ning, an influential Chinese artist and curator, started his Bishan Project (碧山计划, *Bishan Jihua*) in 2011, with Zuo Jing as his partner. Bishan village lies in Yi County, Anhui Province, a province in the central eastern part of China. In Ou Ning’s words, this project showcases “the return to the countryside of intellectuals”, which has the potential

¹ In this thesis, the term “urban-rural migrants” refers to people who choose to move from city to the countryside and settle down there for a long period. They are different from the migration commonly known in China from the following perspectives: 1) The direction of this migration is opposite to the rural-urban one: the source for this migration is cities and the destination is the countryside; 2) Unlike tourists or seasonal workers’ activities, urban-rural migrants’ activities in the countryside last for quite a long time. They actually live in the countryside and/or gage in the activities pursued in the countryside; 3) The work they do and the activities they carry out are not oriented towards economic profit. Although some of them operate guesthouses and bars in tourist towns and villages, making money is not the only and first concern.

to “re-activate public life in rural areas”² (Sun, 2014). With these artists and this intellectual perspective, at the beginning of their project, Ou and Zuo mainly focused on collecting and recording local handicraft techniques, inviting artists, designers, scholars and college students from Anhui University to study and use the traditional handicraft techniques and disseminating their research projects through the publication of *Bishan Mook*³. Moreover, in order to expand the influence of this project, they held exhibitions⁴ and annual events such as the Bishan Harvestival (碧山丰年祭, *Bishan Fengnianji*, referring to the “Festival of Harvest”) to attract more attention. Later, they opened an art bookstore, a café and a guesthouse in Bishan.

Bishan is an experiment in rural renewal to respond to China’s urban transformation on the one hand and “global agricultural capitalism”⁵ on the other (Sun, 2014). The last four decades (since 1978) have seen the co-existence of economic development and rural depression in China, while the share of urban population increased from 19.4% (1980) to 58.5% (National Bureau of Statistics of China, 2018)⁶. For the rural population, a recent survey shows that nearly one third (274 million) are now “floating” (ibid.) because their household registration is still tied to their hometown, even though they mainly work and live in cities. For Ou Ning and many others, the rapid increase of urban population and the huge amount of floating population signal the decay of traditional rural life. Even worse, the decline of the rural population and the disappearance of traditional community life aggravate each other, which in the end gives birth to increasing numbers of “hollow

² This sentence comes from an interview for The New York Times (Chinese) that Ou Ning gave on December 15th 2014. The original text was written in Chinese: 关于知识分子回归乡村.

³ *Bishan Mook* is a magazine first published in 2011. It aims at directing urban intellectuals’ attention to the regeneration of traditional culture in rural China.

⁴ The Bishan Project has been exhibited in Guangzhou, Chengdu, Beijing, Taipei. The latest exhibition on this project was in e Solomon R. Guggenheim Museum, New York, in 2017.

⁵ This sentence comes from an interview for The New York Times (Chinese) with Ou Ning on December 15th 2014. The original text was written in Chinese: 针对目前亚洲地区迫人的城市化现实和全球农业资本主义引发的危机, 试图摸索出一条农村复兴之路.

⁶ According to raw data provided by the National Bureau of Statistics of China, in 1980, there were 191.40 million in the registered urban population and the total population was 987.05 million; in 2017, there were 813.47 million registered urban population and the total population was 1.39 billion. Raw data available at <http://data.stats.gov.cn/easyquery.htm?cn=C01>. Accessed on 15th December 2018.

villages” (空心村, *Kongxincun*)⁷. In this context, a decentralized movement of rural renewal and re-construction has emerged in China. According to Ou Ning’s investigation, around 200 projects of this kind had been set up by the end of 2014. Like the Bishan project, they all want to revive rural economy and preserve agricultural ways of thought and behaviour by running projects in such spheres as agriculture, the economy, education, or culture, etc. so as to attract more people to enjoy life in the countryside.

Rural China, which has been left behind in the last few decades of economic development, is receiving more and more attention⁸. After the decline of a development model that mainly focuses on exports and investment, a new transformation of China’s economy is now unfolding. Domestic consumption and rural development have become key to maintaining sustainable growth in the next few decades (Wen, 2012). Besides the practice of individual artists and activists, local governments and capitalists have also shifted their focus to rural areas, as evidenced by the cases of Xidi and Hongcun, two neighbouring villages of Bishan⁹. For Ou Ning, however, such models of rural tourism development are not at all promising, since “the lack of subjectivity of the local community is the greatest difficulty in rural reconstruction” (Sun, 2014)¹⁰. In other words, local villagers do not have a voice in dealing with capital and power. In Hongcun, for example, tourism industry revenues are distributed between the Tourism Company (67%), the county government (20%), the town government (5%) and the village collective (8%) (Zou, 2005;

⁷ Hollow villages, caused by the exodus of the working-age population, has further negative impact on the rural community, such as the waste of land, the lack of work opportunities, the lack of care for the children left behind and the aging population (Du, Park and Wang, 2005; Biao, 2007; Chang, Dong and MacPhail, 2011; Wang, Yang and Zhang, 2011), etc. Approximately 58 million children, 47 million wives and 45 million elderly people have been left behind in rural communities by their migrant family members (Ye et al. 2013).

⁸ Admittedly, the fast development of China in the past few decades has lifted the mass of China’s rural population out of poverty. But at the same time, the economic development, according to Tiejun Wen (2012), is rooted in the “urban-rural dual structure”. It is this structure, whereby the rural bears the cost of the urban crisis, that has made possible the rapid development of the Chinese economy in the past few decades.

⁹ Taking Hongcun for example, it is now a famous destination for tourists, celebrated for its traditional architecture, carving and the design of its ancient water system. Together with Xidi, the two villages became a UNESCO World Heritage Site in 2000. Scenes from the film *Crouching Tiger, Hidden Dragon* were filmed on location in Hongcun, which spread the fame of this village even further.

¹⁰ This sentence comes from an interview given by Ou Ning to *The New York Times* (Chinese) on December 15th 2014. The original text was written in Chinese: 乡村建设最大的困难是村民缺乏主体性.

China Press Association Web, 2018). For such small sums, however, the diversity and dynamics of everyday life have been replaced by a monotonous rhythm of tourist economy (Sun, 2014)¹¹. In this way, local residents and their community have been commodified. This observation invites further critiques from Ou Ning, who concludes: “the organic village life has become a performance in a Disney theme park. The relationships between neighbours have become those of business competition. I do not think this way of life has dignity” (ibid.)¹².

This is a critique of the neo-liberal tourism development model dominated by tourism companies and local government. It challenges the right of the tourism industry to change the environment of the village and questions the right of tourists to change the local culture through a “tourism gaze” (cf. Urry and Larsen, 2011). In contrast to this kind of tourist exploitation, Ou Ning suggests that his project of rural reconstruction could protect the local community from being marginalized and commodified. Nevertheless, not every visitor to Bishan would agree with him. In July 2014, Zhou Yun, at the time a PhD candidate at Harvard University, published an influential Op-Ed article arguing that Ou Ning’s rural construction project is underlined by an aesthetic taste: Elitism (Zhou, 2014). During a fieldtrip in Bishan, she found that Ou’s Project rejected local villagers’ appeal to economic development through tourism and this, from her view, critiques the vision of intellectual elites who come to the countryside only to make paradise for themselves. In other words, when individual actions become a project, “the imagination of the pastoral village has become a kind of ‘Othering’, which is parallel to the Western gaze of the ‘Oriental’” (ibid.). Later, Ou Ning reflected on his project and admitted that the language and symbolic system he had used in Bishan Village were too artistic, which made it difficult for local villagers to participate (Sun, 2014).

¹¹ These sentences come from an interview given by Ou Ning to The New York Times (Chinese) on December 15th 2014. The original text was written in Chinese: 西递宏村的村民也就是卖卖茶叶蛋, [...], 拉游客到自家开的农家乐住宿, [...]. 村里很多店铺都是旅游公司出租给外地人在做. The link to the original article is: <http://m.cn.nytimes.com/travel/20141215/t15bishan/zh-hant/>

¹² These sentences come from an interview given by Ou Ning to The New York Times (Chinese) on December 15th 2014. The original text was written in Chinese: 原本有机的乡村完全变成迪士尼一样的主题公园, 生活成了表演, 邻里关系也变成了抢生意, 我不觉得这样的生活很有尊严. The link to the original article is: <http://m.cn.nytimes.com/travel/20141215/t15bishan/zh-hant/>

The Bishan Project is an illuminating case for learning what the “urban-rural migrants” are doing in the countryside and what problems they are encountering and trying to tackle. These conducts have prompted a question that involves more than individual choices of lifestyle. They are of course related to debates on the direction of rural development – such as the tourism industry and rural reconstruction – but other questions should also be asked. The foremost is: why and how the local (the community and the residents) is absent in such projects? This is a question about who the local is and who dominates the transformation of rural China. To respond, we need to make clear the way in which these “urban-rural migrants,” together with the local government, are incorporated as new members of the local community, who play critical roles in the decision-making process. The answer to such questions is inherent in the relations between the rural and the urban, because the local subjectivity is transformed not locally but by the arrival of these urban-rural migrants, as well as their cultural and economic capital. The settling-down process of this cultural and economic capital is exactly the process in which the local subjectivity is reshaped.

The aim of this chapter is to depict the context of my thesis. Section 1.2 introduces the everyday encounter of the urban-rural migrants with rural infrastructures at my field site, which is the basis of the discussions on local participation and local subjectivity formation in this thesis. Section 1.3 summarises the literature on infrastructures in China. I find that the role of infrastructures in the urbanisation process has been a central concern of previous studies while the everyday encounters with such infrastructures are generally overlooked. In Section 1.4, I draw on recent discussions in the Science and Technology Studies (STS) and on the Actor-Network-Theory (ANT) to elaborate the theoretical framework of this thesis. STS is helpful for identifying the infrastructure as a socio-technical system, while ANT seems a promising way of analysing the everyday encounters of individuals with such systems. In the final section, Section 1.5, I briefly introduce the structure of the thesis and summarise the key concern of each chapter.

1.2. Infrastructure in the Countryside: Beyond an Issue of Hardware

While the countryside is gaining greater popularity, its infrastructure is still to some extent precarious. Huangyao is a typical touristic town facing this challenge, with both increasing numbers of tourists and a fragile infrastructure. As discussed earlier, the issues in the countryside should be understood broadly within their social, economic and

political contexts. What makes Huangyao unique is not the scale of its tourism economy, but the great political and economic importance attached to this place vis-à-vis its poor infrastructural condition. Here I first introduce the problem of infrastructure in the countryside. Then the tourism development of Huangyao is described along with my experience of the infrastructure struggle there. I want to demonstrate, first, why the political and economic conditions of Huangyao are worth empirical examination; and, second, why the infrastructure experience has become the focal point in understanding the case of Huangyao. I then introduce my research questions in this thesis.

Encounter with the Problematic Infrastructure

In the debate on Bishan, one discussion about the stars and street lighting which drew my attention. In Zhou Yun's article (2014), it was said that Bishan had no street lighting. Everything went dark and silent at nine o'clock in the evening. Although you can see the fireflies and the stars, it does not erase the objective problem of inconvenience. Villagers' infrastructural needs are urgent. But in this situation, the visitors focus on something different. They think that without street lights, they can see the stars. By mentioning the debate of streetlights and stars, I mean neither to criticise the visiting intellectuals' understanding of infrastructures for being unrealistic, nor to criticise the villagers' concern for being too utilitarian. The point in this debate is that infrastructure is an integral part of rural life, which places groups with different concerns on the same platform. In addition to these two categories of person, the technology of street lighting should also be taken into consideration as an important actor. For example, is there technology which would support the switching on of street lighting when a user was near, or could switch it off when people wanted to view the stars? It also made me as a researcher aware that the study of the process of local participation and subjectivity formation should start from daily encounters of this kind. In this sub section, I shift the focus from the abstract discussion of participation to everyday encounters with the infrastructure in Lugu Lake and Dukezong Ancient City as examples. I drew on them to figure out my research questions on the awareness of local participation and dealing with the disruption to the infrastructure.

The first story is about Lugu Lake, told me by Mr Lv, a guesthouse owner there. His guesthouse stands on the bankside of Lugu Lake, deep in the mountain area in Yunnan province, 2600 metres above sea level. He still remembers clearly that on December 31st

2012, the village experienced a terrible blackout. Basic lighting could not work without the support of electricity. Even water taps were frozen, since there was no electric heating available to thaw the pipes. Since it was New Year's Eve, the guesthouse was fully booked. Therefore, Mr Lv and his employees had to use the "pristine" ways to deliver services: they lit a huge number of candles for lighting; they drove up the hill and brought back mountain spring water; they heated the water by building a bonfire; and they delivered hot water to every guestroom, bucket by bucket, for showers. From the perspective of the tourists, lighting candles and a bonfire on New Year's Eve on the banks of Lugu Lake sounds quite romantic. However, for Mr Lv, it could have been a major fire hazard. He complained that "no matter how late it was, I had to sit in front of our garden gate and wait until all the candles in every room had been blown out." This reminds us once more that people who are actually living with the problematic infrastructure view it differently from those who have come as sightseers, though they are staying in the same place and connected by the same problematic infrastructure.

This problem is quite common for many other touristic towns, especially ancient towns with limited infrastructural capacities. In some cases, the result is even more tragic. On January 11th, 2014, Dukezong, also known as Shangri-La, suffered one of the biggest fires in its history. Overloaded electricity wires generated sparks, which then worked together with the dry climate and a strong wind to start fires. Moreover, narrow roads and frozen fire hydrants made firefighting impossible. Since all Dukezong's buildings had maintained the architectural tradition of wood construction, it was almost impossible to save their original appearance once a fire broke out. Villagers and urban-rural migrants could do nothing but watch their houses and business disappearing one by one. Two thirds of the ancient village burnt to the ground. The overloaded electricity wiring revealed the mismatch between modern tourism and the infrastructure base of ancient towns. In fact, it may be said that the material bases of ancient towns and cities were never designed to accommodate modern infrastructure and ways of production. This also explains why what is happening in the touristic villages/towns is not a rural issue. It is the population, capital and culture coming from elsewhere, along with their alien infrastructure.

Solving the problem of infrastructure is not easy for urban-rural migrants – nor for the business owners, nor the intellectuals and artists. Ou Ning did try, by setting up streetlights for Bishan village. However, Ou Ning's a temporary public lighting can operate as an individual project only for special events. Similarly, when the infrastructure

service in Lugu Lake fails, Mr Lv and his staff became infrastructural labourers, temporarily replacing the absent physical infrastructure. In places where there is no clearly delineated notion of how the infrastructural system is bounded by the inhabitants, people are always considered the infrastructure (Simone, 2004, p. 407) and form a “flexible configuration” (ibid., p. 411) following the cultural and economic practices. Although this research will not discuss the infrastructural metaphor of social collaboration, with the help of Simone’s concept “people as infrastructure” (Simone, 2004)¹³, I want to emphasise that physical infrastructures cannot be understood solely as systems of circuits and pipes hardware. As something that penetrates our daily lives, it constantly shapes our perception of the space in which we lead our lives. Moreover, public utilities, such as the electricity system or piped water, also link all users on the same platform and provide a terrain where concrete interaction and negotiation may be observed.

Huangyao: State-led Urbanisation through Tourism Development

Huangyao, my field site, lies in the northeast of the Guangxi Zhuang Autonomous Region, southern China. It is a town in the administrative hierarchy, subordinate to Zhaoping county, with 19 villages and sub-districts under its administration, covering a total area of 244 square kilometres. At the centre of this town lies Huangyao Street Village (3.6 square kilometres), in which Huangyao Ancient Town is included, covering an area of 0.688 square kilometres. “Ancient Town” is the literal translation of Guzhen (古镇)¹⁴, referring to a place that keeps its traditional architecture and lifestyle. This is where I carried out the ethnographic work for this research. Huangyao is far from modern transportation links. While the rapid economic development changed many parts of China, Huangyao has remained undisturbed. However, an undisturbed Huangyao also means a place where local people have for decades been suffering poverty. With the desire for economic development, the local government integrated the natural ecological resource

¹³ Using human labour as infrastructural actors reveals the core value of infrastructure which emphasises that “concrete acts and contexts of social collaboration [are] inscribed with multiple identities rather than in overseeing and enforcing modulated transactions among discrete population groups” (Simone, 2004, p. 419).

¹⁴ Similar expressions for places like Huangyao include Ancient City for Gucheng (古城), Ancient Village for Gucun or Guzhai (古村, 古寨) and Ancient Street for Gujie (古街).

with the cultural historical resources of Huangyao Ancient Town and made it a popular site for the tourism economy. In 2007, the ancient town was listed in the catalogue *China's Historical and Cultural Towns* (中国历史文化名镇, *Zhongguo Lishi Wenhua Mingzhen*) and in 2009, it was rated as a national 4A Tourist Attraction¹⁵. From Zhaoping County Government to the above-level Hezhou (prefectural) City Government, local governments have played an important role in promoting the Huangyao's tourism development and much importance has been attached to it.

In parallel with the tourism industry, a process of urbanisation has affected Huangyao. Confirmed by the master plan of Huangyao, its tourism industry is supported by more relocation to clear construction land. Besides the 0.688 square kilometres of the Ancient Town area, 6.74 square kilometres are defined as the core development area for further construction use, which is twice as big as the previous Huangyao Street Village (see Section 4.3). However, the local residents did not give the plans for land relocation and transfer a smooth passage. The burden of land requisition reflects the contradictory positions of the local residents and the local governments in tourism development. Moreover, my ethnographic observation has noted that, unlike the local governments' passionate embrace of tourism development, the local residents and business owners hold a complex attitude to the tourism development. They doubt whether the development of tourism industry can benefit the local community.

It is clear that the development of tourism is inseparable from the land-centred urbanization process. The state-led tourism project designates the Ancient Town as the core developmental zone of a tourism economy to attract investment for development. While the project is growing, more land and resources for further support will be designated by the local governments. During this process, the local state (the prefectural city and county government) and developers are considered the main planners, the main investors and the main participants. In the interests of balance, however, it seems that the voices of local residents and small business owners are not heard. Besides local governments' effort to lead the project and local community's anxiety about being

¹⁵ Tourist attractions or scenic areas are rated by the Ministry of Culture and Tourism of China. A 5A (AAAAA) tourist attraction denotes the highest level in the rating system and 4As indicates one level lower. Up to 2018, 248 tourist attractions in China had been rated as 5A. Detailed information may be found from <http://bmfw.www.gov.cn/lyjgj5Ajjqcx/index.html>.

marginalised, what makes the case of Huangyao more urgent is the obstructive condition of infrastructure. The precarious electricity supply in the ancient town centre has not been improved since the tourism development started. Peak touristic times always experience power cuts. Individual business owners have recorded that more than 300 blackouts occurred in 2016 (see Section 6.2). More than one blackout often occurs on the same day and they can last for more than 10 hours. The contradiction between the precarious infrastructure conditions and the huge importance attached to the tourism development attracted my attention.

Research Questions

The puzzle of Huangyao's infrastructure upgrade seems not a mere technical problem, since the electricity infrastructure outside the Ancient Town centre had been already upgraded. It is hence worth further enquiry to learn why and how such a problem could happen. Taking the problematic infrastructure and its upgrade puzzle as the entry point, I developed this research further by focusing on 1) the political and economic context of the infrastructure construction; 2) the plan for a further infrastructure upgrade; 3) everyday encounters with the precarious infrastructure condition. Three specific research questions were generated with the infrastructure as a focal point:

First, why is there a problem with the electricity infrastructure in Huangyao? To what extent is the infrastructure problem inseparable from the tourism development mechanism and urbanisation of Huangyao? What kind of politico-economic situation is this touristic town embedded in? Who are the main actors that define the current Huangyao? Second, why can the problem of electricity infrastructure in Huangyao not be solved? What is the involvement of the human and non-human actors in the process of designing and implementing an upgrade in the electricity infrastructure and practice? Third, how does the local community live with the precarious electricity infrastructure? How do the people perceive the disrupted infrastructure? What strategies do they adopt in the course of the tourism development and upgrade of the electricity infrastructure? As it is always assumed that the local is marginalized, how does the local act within its limited options? Three empirical chapters, Chapters 4, 5 and 6, deal in sequence with the above three sets of questions.

1.3. Infrastructure Studies in the Context of China

In China, there is a famous folk saying about the importance of (transportation) infrastructure: if you want to get rich, build a road (要想富, 先修路, *Yao Xiang Fu, Xian Xiu Lu*). It seems that there is a positive correlation between the access to transportation networks and economic outcomes, since transportation infrastructure can facilitate mobility and migration, reshape economic geography (The World Bank, 2009) and hence become the engine of economic growth. The empirical evidence on the link between Chinese infrastructure investment and economic growth from 1985-1998, suggests that infrastructure did “account significantly for observed differences in growth performance” (Demurger, 2001, p. 97) across rich and poor provinces. However, other research provides different explanations. Banerjee, Duflo and Qian (2012) show that “better access to transportation networks does not have a large impact on the (relative) economic performance” (p. 5), because “transportation infrastructure by itself does not really do very much, excepting perhaps where there was already a demand for it” (ibid.). Comparing these two studies, it seems that there are contradictory ways of linking economic growth with infrastructure construction. This thesis does not aim to discuss the causal relationship between infrastructure construction and the booming of the regional economy. Instead, on the basis of this comparison, my question is what specific roles infrastructure plays in contributing to the increase in economic growth? If the construction of infrastructure contributes to economic development, why, in the case of Huangyao, which is eager to expand its economy, has there been no proper construction of the electricity infrastructure? Does this mean rather that only the construction of a certain kind of infrastructure can promote economic development?

Drawing on studies in the first sub-section (below) of the relationship between infrastructure and urbanisation in China, it seems that a mechanism links infrastructure construction and economic growth through urbanisation. In this context, infrastructure is understood as an instrument to achieve particular economic and political goals. This may help to explain why places such as Huangyao on the one hand show economic growth, but on the other lack infrastructural support for everyday practices. Moreover, in the second sub-section, the perspective of the discussion moves from the ground upwards. It views the infrastructure as a terrain on which individual users can negotiate, resist and participate, especially those who belongs to subordinated groups. The concrete

negotiation around the infrastructure is shown to enable the making of subjectivities – the exercises of voices – in non-optimal conditions.

Infrastructure and Urbanisation in China

Infrastructure plays an important role in China's urbanisation, especially when urban expansion is the central theme. Sometimes, urbanisation should be understood only as urban sprawl, since it “expands urban space and in turn inflates urban population size without necessarily urbanising the overall landscape or economy” (Yew, 2012, p. 281). Rural land is particularly important for land-centred urbanisation processes to achieve urban space expansion (Wu, 2002; Hsing, 2006; Ding, 2007; Lin, 2009; Hsing, 2010; Ong, 2014; Shin, 2014; Zhao, 2017; Shin and Zhao, 2018). Infrastructure is the core element for maintaining and operating this expansion, through which the rural, the urban and urbanisation are included in the same process. Here I first discuss how infrastructure facilitates urban expansion by providing both the justification of being of public interest and a better commercial and industrial basis for raising the price of leasing land. The second step concerns the way in which infrastructure construction is supported and financed by urban expansion. Land lease revenues and investment from the private sector provide significant financial support for infrastructure construction.

In 2002, *Stipulations on tendering and public auction of the use-right of state-owned land* (招标采购挂牌出让国有土地使用权规定, *Zhaobiao paimai guapai churang guoyou tudi shiyongquan guiding*) (Ministry of Land and Resources, 2002) was released. Supported by this official document, local governments have been able to claim a considerable amount of revenue through the right to lease land use. Under this background, once rural land could be justified for urban construction purposes, it can be converted from collective ownership land to state ownership¹⁶. In this process,

¹⁶ In China, land is publicly owned. In cities, the land is owned by the state. In the rural areas, village collectives own the land. Against the disadvantages of a lack of incentives for collective land ownership, China took a circuitous path by keeping collective ownership and at the same time leasing the right to use land. Therefore, in the cities, local governments (normally the municipal governments) become the agent for land leasing. Once the land is claimed for urban use, it will be first transferred from village collectives to the local authorities and then leased for further investment (for further discussion see Section 4.3). In the rural areas, individual households have access to the land management right, but the ownership belongs to the village collectives (or non-agricultural rural enterprises). The institution which separates land ownership from the right to manage land was started in 1983, when the Household Contract Responsibility System

infrastructure construction, which is closely related to the public interest, can serve as good justification (Ding, 2007). At the same time, better infrastructure conditions, such as a better transportation system (Demurger, 2001; Zou *et al.*, 2008), are better for commercial and industrial uses, and this then “contributes to a further hike in land prices” (Yew, 2012, p. 285). The urban expansion also supports in its turn the construction of infrastructure. In 2002, another document concerning financing urban infrastructure construction *Suggestions for acceleration of reforms on the marketisation of urban utilities* (关于加快市政公用行业市场化进程的意见, *Guanyu jiakuai shizheng gongyong hangye shichanghua jincheng de yijian*) (Ministry of Construction, 2002) was also released. With the support of this document, capital from enterprises, society and even foreign countries can be used in the operation of public utilities. It is discovered that revenue from leasing land-use rights (Wu, 1999; Peterson, 2006; W. Wu, 2010; Wang *et al.*, 2011; Yew, 2012) and borrowing from both domestic and foreign sources (Wu, 1999; Su and Zhao, 2006; W. Wu, 2010; Wang *et al.*, 2011; Yew, 2012) has become an increasingly important component in funding and maintaining the infrastructure construction.

Through these two steps of mutual support, a mechanism between urban infrastructure and land-centred urbanisation has been formed. It is concluded (Wang *et al.*, 2011) that, first, a shifting boundary was erected between the government and the market in the market-oriented era, which transformed the city governments “into entrepreneurial agencies oriented towards the proactive promotion of development within their territories” (*ibid.*, p. 2994). Moreover, since not all levels of local governments have the same access to the option of land financing, power was also redistributed between the levels of administrative hierarchy. In general, “the cities with senior administrative [are ranked at] the expense of those at the bottom, therefore intensifying the development of inequality in the urban hierarchy that has drawn scholarly attention” (*ibid.*, p. 2995).

However, under this mechanism in which infrastructure and urban expansion get help from each other, infrastructure is treated as an instrument to achieve certain economic and political goals. Therefore, the use value of infrastructure is not guaranteed. Increasing

(家庭联产承包责任制, *Jiating Lianchan Chengbao Zerenzhi*) was officially released by the official document *Some Issues of the Current Rural Economic Development* (当前农村经济政策的若干问题, *Dangqian Nongcun Jingji Zhengce de Ruogan Wenti*) by the CPC Central Committee.

numbers of infrastructure projects that are environmentally related have been started, such as green infrastructures (Zhao, 2017; Chung, Zhang and Wu, 2018; Shin and Zhao, 2018), public green land access (Chen and Hu, 2015) and eco-city and eco-tourism (Chien, 2013) projects, incorporated in the above mechanism. Through this process, more and more rural transformation can be seen. However, “a negative relationship [is discovered] between the reliance on land finance and the amount of urban public green spaces” (Chen and Hu, 2015, p. 32). This statistical analysis is echoed by the Beijing green-belt study, which argues that green-belt projects are taken up by municipal governments in order to generate more land leasing revenue and enhance such regimes (Zhao, 2017).

Living with Infrastructure and the Ground-up Perspective

In contrast to the urban landscape with the support of infrastructure, some places work without any stable infrastructure or constant infrastructural maintenance. Sometimes, these places, such as urban villages and urban fringe areas, have no physical infrastructural arrangements at all. The disruption of infrastructure or the absence of stable infrastructure makes “infrastructural lives” (Graham and McFarlane, 2015). They reveal how far living with infrastructure has become normalised; such lives become visible when the infrastructure fails to work (Graham, 2010). Most of these studies are derived from the global south, where people have to learn how to deal with unstable infrastructure and allow infrastructure contingencies to play a role in their everyday goings-on. This enables the study of infrastructure to focus on the everyday, which is “both a key domain through which practices are regulated and normalised as well as an arena for negotiation, resistance and potential for difference” (Graham and McFarlane, 2015, p. 2)¹⁷.

In the context of China, as well as the way in which local governments and developers regulate and produce infrastructure in general, the study of infrastructure from the everyday perspective pays more attention to ordinary users and subordinated social groups from the ground up. Relevant studies on infrastructure (or infrastructure related subjects) in these places deals with waste and pollution, including waste pickers (Wu and Zhang, 2015) who live and work on the urban fringe of Beijing, and people dealing with

¹⁷ More empirical studies will be discussed in Sections 2.4 and Chapter 6. In this section, I focus only on studies in the context of China.

industrial pollution with health problems (Lora-Wainwright, 2017) who live in villages. These studies show how individual lived experiences are linked with infrastructure related activities although no proper physical infrastructure solution has been provided. These people are not passive objects merely accepting and coordinating with the dominant power structure. It is argued by Lora-Wainwright that they typify “resigned activism”, in which “the most pervasive attitude to pollution among villagers is neither plain opposition nor complete complicity but rather ambivalence” (ibid., p. 169). It is the concrete negotiation that makes individuals from the ground up show their subjectivities, looking for a way out in non-optimal conditions.

Empirical studies of infrastructural subjects are still limited in the context of China. However, I want to bring up some research from Chinese critical urban studies with a similar character. In *The Great Urban Transformation*, Hsing (2010) adopted the term “Civic Territoriality” to refer to social actors’ conscious cultivation and struggles to form their own territoriality at both physical and discursive levels. Through their territorial negotiation and resistance, she stresses the importance of social and economic relationships from the perspective of space. Although Hsing’s study is not about infrastructure, her approach links the individual’s participation and subjectivity with land material. Taking the land as the most important “territorial concrete”, the power dynamic embedded in the spatial transformation process may be seen. The struggle over the control and occupation of a location turns the place into a territory. The politicization of place is a phrase coined to cover the social, political, cultural and ideological meanings in the physicality of location and locale. How can we shift the focus from the territory to the infrastructure to reveal the social, economic and political dynamics? How are infrastructural subjects made? In the next section, I introduce the framework adopted in this thesis, which also illustrates the reason why we need to put infrastructure at the centre to answer the research questions listed above.

1.4. Infrastructure Participation: A Framework

The theoretical framework adopted in this thesis takes a co-evolutionary perspective on technology and society. Taking a non-mechanistic view perspective of society and technology, I think it would be best to define technology as not being external to the social environment. Instead, it is “a complex set of connections, or relationships, within a particular culture” (Slack and Wise, 2015, p. 126). From this perspective, the

infrastructure may be defined as a socio-technical system that consists of physical objects, a social order, economic rationales, cultural perceptions and legal debate. This is not simply to add up the social and the technical to form an overall structure, but instead to emphasise that the social and the technical are always contained within each other (Law and Mol, 1995). In this framework, the investigation of the upgrade of the electrical infrastructure in the tourist town of Huangyao in the context of its urbanisation displays particular significance and uniqueness.

The spatial dimension of infrastructure under capitalism has been examined in critical urban theories (Harvey, 1985, 1996; Lefebvre, 1991; Swyngedouw, 1993; Kaika and Swyngedouw, 2000); the social construction of technology (SCOT) (Bijker, Hughes and Pinch, 1987; Pinch and Bijker, 1987a; Bijker and Law, 1997), and Large Technical System research (LTS)(Hughes, 1987; Hughes and Coutard, 1996). The political economy approach (Swyngedouw, 1993; Harvey, 1996; Graham and Marvin, 2001; von Schnitzler, 2013, 2016) explores the context in which infrastructure is embedded, together with the institutional, economic and political relations that infrastructure embodies. Moreover, from the perspective of infrastructure itself, in its material basis various actors are preserved (Latour, 1994), and this plays an important role in facilitating the users' participation through their everyday use, constant maintenance and partial repair. It reveals the contingency of infrastructure (Hinchliffe, 1996; Graham, 2010; Furlong, 2014) as a heterogeneous system (Aibar and Bijker, 1997; Bennett, 2005; Latour, 2005; Coutard and Guy, 2007). Hence, individual users may be considered active and the infrastructure becomes participatory. In the following paragraphs, I want to explain how this framework works together with the empirical chapters to answer the research questions raised in Section 1.2.

By taking a co-construction perspective, this thesis stands in opposition to determinism, which sees things from the perspective of a mechanistic causality between society and technology. If technology is a deterministic matter, it can be explained only as something autonomous, originated by a self-generating force. It fails to realize the social and cultural context where it comes from (Slack and Wise, 2015, p. 121). Therefore, as argued by the Social Construction of Technology (SCOT) and the study of Large Technical Systems (LTS), the success (or failure) of technology is not only the result of individual innovation and technical character, but also a matter of the social, political and economic context as a whole. Yet the social is not also external to the technological. Instead of taking the

social structure as a container only for the social action of human actors, material and technological elements are already built in to it and the boundary between human and non-human agency cannot be clearly demarcated. What should be noted here is that this thesis advocates neither the simple social shaping of technology nor the technological shaping of society. Adding these two sides together does not make the whole. In the course of analysis, the starting and focal point may stand on the social or the technical side. But the big picture behind both should always be the co-construction and co-evolution of technology and society.

From this perspective, the first step of analysis should look at the social environment where the problem of infrastructure emerges. Rather than its background, I would say that the tourism development and urbanisation of Huangyao are where the problem of infrastructure is rooted. As suggested by infrastructure studies in the context of urban sprawl, a mechanism is formed between the construction of infrastructure and land-centred urbanisation under the regulation of local states (Wu, 1999; W. Wu, 2010; Wang *et al.*, 2011; Yew, 2012; Zhao, 2017; Chung, Zhang and Wu, 2018). Therefore, the problem of upgrading the infrastructure in the Ancient Town leads us to a power relation which operates behind the flow of electricity. The answer to what makes the problem of infrastructure is not limited to technological or engineering matters, which are merely a tautology. Instead, the answer lies in the urbanisation strategies, land transfer process and political and economic relations between the relevant social actors, which are examined in Chapter 4. As a terrain for capitalist production, space is unevenly divided by bypassing non-valued users and privileging the powerful or potentially valued users (Graham and Marvin, 2001, p. 288). Therefore, the discussion of the infrastructure dispute should shed light on the struggles for control and power through the regulation of space prompted by tourism development.

After analysing the context in which the problem of infrastructure originated, I took more closely look at what exactly the problem of infrastructure consists of. Studying the infrastructure stands at the opposite extreme from the taken-for-granted process of using infrastructure. Infrastructures are treated as substrates (Star, 1999, p. 381), whose transparency is only ever noticed when they are disrupted (Graham, 2010). Infrastructure disruption puts the infrastructure at the centre of this thesis again. By focusing on the disruption, the research reveals the process through which infrastructure is normalised and authorised historically and locally (Sismondon, 2010). In the process of normalisation,

groups with conflicting ideas reach a specific outcome to conclude the dispute (Bijker and Law, 1992b, p. 13). The disruption of infrastructure provides a chance to open the black box concealing this process and make the problems visible again.

Against this background, in Chapter 5, I examine the question of why the problem of infrastructure in Huangyao cannot be solved. How does a problematic infrastructure come to an end, when the dispute turns out to have gradually become an unsolvable problem? From the Marxist perspective, infrastructure embodies a fetishist view through which resources are elevated away from their origins and commodified for exchange purposes (Kaika and Swyngedouw, 2000, pp. 122–123). The power industry reform in China, which transformed the electricity service into a pure commodity, echoes this kind of argument. At the same time, the tourism economy of Huangyao has been transferred to the regulation of the prefectural city government. Through the upscaling effect of the tourism economy and the power industry reform the electricity upgrade, whose practice has to coordinate with the local community, has become impossible.

This thesis provides an analysis of the way in which infrastructure originated in its social and political environment; and aims in doing so at avoiding an instrumental view of infrastructure. For Bennett (2005, 2010), electricity infrastructure may be defined as a complex assemblage that connects various human and non-human actors¹⁸. In other words, there is no fixed boundary to what is counted as part of an infrastructure, since congealed labour and technology carry the past elsewhere to the present and the local (Latour, 1994, p. 40). In this context, daily use, partial repair and small technological devices (von Schnitzler, 2008; Furlong, 2014; Anand, 2015; Gupta, 2015) are all possible ways of altering the infrastructure system. Taking the users into consideration, it challenges the common understanding that infrastructure is always there to provide constant and stable service.

This is the basis on which in discussions on the infrastructure system we may incorporate everyday infrastructural practice. In Chapter 6, besides infrastructural regulation and normalisation, the negotiation through everyday infrastructure use is found to be worth examining; it provides a concrete terrain for the competition for electricity and its

¹⁸ Details of the human and non-human actors are discussed in the methodology chapter (see Chapter 3). I focus as the main method on the use of the Actor-Network-Theory.

upgrading¹⁹. Although the infrastructure in the core area of Huangyao cannot provide an ideal service, people still have to depend on its support to live and do business. The regular electricity disruption transforms its users as infrastructural subjects, who consciously participate in the maintaining and repair of the electricity infrastructure, by adopting additional electric devices to overcome the deficiencies in the supply. In the meantime, the electric infrastructure has been transformed into a political terrain, upon which individual users' appeal for an infrastructure upgrade is expressed and negotiated.

As shown by the brief literature review in Section 1.3 and the theoretical framework in Section 1.4, above, I introduce the central role played in this thesis by infrastructure. Politico-economic concerns are manifested through the disruption of the infrastructure. At the same time, dealing with the problematic infrastructure also turns the users into infrastructural subjects, who trigger the political action functioning through the problematic infrastructure itself. I develop this thesis from these two perspectives. As shown by Section 1.3, users' participation through the everyday use of infrastructure is critical to this thesis. However, little research can be found on this topic in the context of China. To bridge this gap, the next chapter reviews more theoretical discussion and empirical studies from the perspective of everyday infrastructure. Before moving to the next chapter, let me briefly introduce the structure of this thesis, singling out the main points of each chapter.

1.5. Thesis Structure

Chapter 2 reviews the theoretical debates and empirical studies of infrastructure. Its purpose is to support the decision to put infrastructure disruption and obstacles to upgrading at the centre of this thesis. The discussion starts by providing a co-construction perspective, which avoids splitting the world into being either technologically or socially determined. From this perspective, infrastructure is understood as a social-technical system, which does not deal only with mere physical technological objects, but also with the social order and political debates normalized through its physical forms. To explain this understanding of infrastructure, the chapter first seeks help from critical urban theories to analyse the politico-economic relationship embodied in the forms of

¹⁹ For more on this subject, see Section 2.4.

infrastructure. The discussion then shifts to the tradition of Science and Technology Studies (STS) to examine the infrastructural forms of domination, negotiation and resistance of the social and political relations.

Chapter 3 illustrates the research methods used in this thesis, together with its theoretical support. The discussion starts by reassembling society as a series of ongoing processes rather than set of pre-existing pictures. With the support of the Actor-Network-Theory (ANT), which argues that both human and non-human elements collaborate to produce this social assembly, this research justifies the use of an electricity wiring system, in its everyday interaction with other actors, as the core independent variable. Life-history interviews with the users of the infrastructure system are adopted as the main research method. The chapter describes and defines how Huangyao was chosen as the main field site for the ethnographic work. Finally, the specific methods of approaching key informants and collecting data are described.

Chapter 4 focuses on linking the state-led territorial urbanisation of Huangyao with its tourist economy. This is where the problem of the electricity infrastructure upgrade is contextualized. That the problem of electricity is a politico-economic concern rather than a technical problem is clarified. While local governments hold a dominant role in promoting the tourist economy, planning the urbanisation of Huangyao and regulating land transfer for further construction, the opinion of the local community is strongly resistant, despite its limited opportunities to participate. Since working on infrastructure needs coordination between all stakeholders, including the local community and the local state, the disruption of and obstacles to the upgrading of the infrastructure reveal the mutual exclusion between local residents and the local government in the process of urbanisation through boosting tourism.

Chapter 5 focuses on the disputes over the electricity infrastructure upgrade during the urbanisation and the tourist economy development. Upgrading the provision of electricity in Huangyao is a non-communicable practice, which gathers together the various attitudes of agents and non-human actors involved to the electricity upgrade. It explains why the current politico-economic context prevented the problem of the electricity infrastructure from being solved. It also serves as a historical probe by looking at the way in which electricity was and will be supplied in Huangyao. It shows that the “rural electricity reform” (农电改革, *nongdian gaige*) has played an important role in transforming

electricity from a substantial commodity, which integrated with other, non-electric, institutions, to a formal commodity. Together with the tourism project, which has been lifted out of the hands of the local community, the electricity upgrade has turned from a practice into no more than a set of designs on the map.

Chapter 6 investigates the effect of the “electricity boosting” initiated by individual business owners in the Ancient Town. As discussed in Chapters 4 and 5, the electricity shortage could not easily be resolved in the existing circumstances. As a result, when the business owners accepted the disrupted infrastructure as an everyday concern, additional infrastructural devices and technics had to be adopted. The precarious condition of their electricity became something they had to live with. It also turns out that this unpredictable electricity itself became the only possible way to seek any change to this current situation. By adopting small devices, the “electricity boosting” was maintained, and repaired and altered the electricity system on a very local scale. This turned the infrastructure itself into a political terrain, upon which political questions could be raised, discussed and negotiated.

This thesis concludes with Chapter 7, which highlights the infrastructure participation in the context of the tourism development in Huangyao. It summarises the key points raised in the empirical discussions by considering the politico-economic concerns expressed through the problematic infrastructure and the political action functioning through the contested infrastructure. In addition, it summarises the contribution that this thesis may make and what issues are discussed, here only to an extent but worth further study.

Chapter 2 Literature Review

2.1. Introduction

This chapter aims at evaluating and defining the concept of “infrastructure”²⁰. It proposes some approaches for the study of infrastructure within the scope of critical urban studies, together with science and technology studies. The following three sections review the literature of infrastructure by being based on a co-construction approach (see Section 2.2). Intending to challenge mechanistic views of causality and a determinist mindset, this thesis views the infrastructure as a socio-technical system, which consists of both technological objects and social orders. It argues that the technological innovations and the immaterial orders are not external to each other, but rather come from the same environment.

Not for the first time, this approach suggests looking at the history of something as it is normalised in people’s everyday lives. The normalisation of infrastructure is not neutral and ethics-free. Taking a socio-technical understanding of technology, the political economy approach reveals the power dynamic along with the normalisation of the infrastructure system (see Section 2.3). The capitalist desire to create a space-less world (Swyngedouw, 1993) – a distance-free world with no spatial barriers (ibid., p. 313) – has always been intertwined with the expansion of infrastructural connections. Therefore, critical urban theories define the infrastructure as a physical articulation of uneven distribution. This approach helps the historical study of infrastructure on the macro level to transcend pure historical description, by focusing on the way in which the social forces are competed for and the symbolic meanings were embodied.

²⁰ This is a literature review only on the treatment of infrastructure and space. Some literature on infrastructure studies in the context of China is provided in Chapter, the Introduction. I will run a review of other texts in all the chapters as they become relevant to the chapter in question.

The uneven social order is constructed, distributed and even competed through infrastructural forms. Since utilities are being consumed by users all the time, what we should not ignore is the materiality of the infrastructure, presented in the form of wires, tubes and technological devices, as well as material-based use and maintenance. Assemblage theory and actor-network theory plug the limitations of critical urban theories regarding the discussion of human-machine encounters with infrastructure (see Section 2.4). In this thesis, when the discussion goes to a micro level, infrastructure is viewed as a series of heterogeneous networks, with various actors, both human and non-human, meeting and competing. It credits all the actors who have a place in this infrastructural assemblage. Therefore, instead of having a pre-determined causal relationship, we have infrastructure, with its contingent nature. Such a system can stay stable only through constant maintenance, otherwise the changes stemming from the users' intentional/unintentional participation may alter the system little by little. Based on an analysis with this approach, infrastructure may be viewed as the terrain for political participation and competition, which brings the location of political discussion from the public sphere to that of the everyday consumption of infrastructure.

This chapter also provides a section for closure (see Section 2.5), which consists of a summary of each section and a note of the direction taken by the theoretical approaches that each empirical chapter will follow.

2.2. The Co-construction of Infrastructure

To start this section, I use the “Toaster project” (Thwaites, 2011) as an example of the complexity of the network within which we are living. A toaster is one of the most common kitchen appliances that everyone can buy from any supermarket or department store. In 2010, Thomas Thwaites started a project which aimed at making a toaster by oneself. What made this project unique was that even the things of which the toaster consists were made from scratch. The project was not to assemble a toaster from any existing material, such as plastic or metal, although assembling a toaster is not at all easy, since a toaster costing 3.94 GBP to produce contains 400 different pieces made out of more than one hundred different materials²¹. Instead, the artist chose a more challenging

²¹ Detailed information about The Toaster Project may also be viewed in the Ted Talk by Thomas Thwaites “How I built a toaster – from scratch”, with link:

task: of making all the components from the ground up by digging up the raw materials. It is not hard to imagine that the final work, the homemade toaster, would have looked impressive, priced at 1187.54 GBP. The unskilful shape of Thwaites' toaster clearly shows the grand-scale processes hidden behind the smooth plastic casing of the industrial products that we consume every day. In addition, the more than 250 times the average price also shows the 3.94 GBP of a normal toaster from a store does not reflect the actual cost. It raises our awareness that even the most common things that we use every day have been dug out of the ground and are made from its elements. Infrastructure is the same sort of thing as a substrate (Star, 1999; Graham, 2010), penetrating into every aspect of life without being noticed.

Figure 1. The final version of the toaster which was made from scratch.
Source: The Toaster Project, by Thomas Thwaites (2011, p. 183).

Behind the smooth plastic casing of a common toaster in the supermarket is the capitalist mode of production, consisting of complex relational networks that our lives, as well as the toaster, are embedded in. In the past, people only dealt with things happening in front of them. If someone needed a new house, she or he could have one with the help of a couple of neighbours in the same village. If a village needed water, help from a few villagers would be enough to dig a well. People produced things with their own hands, or sought help from other people nearby. Consequently, what people cared about grew and changed in a traceable way, for example, their health and the crops on the land. Things in the distance simply stayed in the distance. However, this situation has changed since our lives began to be mediated by a range of infrastructure systems. Making electric devices work in one's house is much more difficult than lighting a candle. Setting up electricity system needs the cooperation of engineers, for the design, of government for the regulation, of investors for financial support, of factories for the production of hardware, and so on. Here, infrastructure is the collective name for the collaborative products of unfamiliar people and institutions. In modern ways of living, things change significantly with the help of infrastructure. What changes people's way of life is not only the technology or the infrastructure itself but, more significantly, is the effect of using and living with infrastructure systems. Using electricity means relying on people whom you

never knew and you will never know. Or, in other words, the growing dependence of infrastructure connection means giving part of oneself to the untraceable and unknown world mediated by the infrastructure.

Modern life, especially life in cities, provides perfect examples to illustrate the increasingly tightly coupled and multi-scale interdependencies that result. Almost every aspect of people's lives, including transportation, communication, energy consumption, waste disposal and health care, is significantly supported by various infrastructure systems (Graham, 2010). Borrowing McLuhan's famous differentiation between the content of the media and the means by which the content is delivered, Easterling (2014) argues that the transportation runs through the infrastructure is just the surface disguise of the infrastructure itself. How to organize and circulate the objects and surface content is determined by the infrastructure space, which works as an operating system to shape the city's life (*ibid.*, pp. 9–10). What the media are saying does not show what the media are doing, or sometimes, it prevents us from seeing what is actually happening. From this perspective, she further argues that the significant changes of the world are not written “in the language of law and diplomacy, but in these spatial, infrastructural technologies” (*ibid.*, p. 10).

Regardless of the deterministic approach which will be discussed in the next paragraphs, what Easterling recognises is not only the heavy dependence of our modern city life on infrastructure, but also the power of infrastructure to shape and organize human life. In the following paragraphs, I discuss the inescapable relationship between the social world and the world of infrastructure, which always appears in the form of technology. I start from the question whether there is a causal relationship between the two, or whether they are co-constructed I adopt the answer provided by the Social Construction of Technologies (SCOT) (Bijker, Hughes and Pinch, 1987; Hughes, 1987; Pinch and Bijker, 1987a; Bijker and Law, 1997; Bijker and Pinch, 2012) as a starting point, arguing that the “social” and the “technical” are co-constructed process originating from within each other. I continue by focusing on, in particular, the approach of the Large Technical System (LTS) to discuss how technological systems such as infrastructure systems, are normalised and defined in society according to our common-sense encounters with them. In the last part of this section, I focus on the power relationship involved in the normalisation of technological systems and argue that a political perspective may be taken of the infrastructure discussion, which serves as the starting point for Section 2.3.

Social Construction of Technology

What is infrastructure? And how do infrastructures function in relation to the human world? The discussion may be situated within the scope of Science and Technology Studies (STS), which focus on the relationship between scientific/technological knowledge/practices and the social/cultural world. According to different assumptions of causality, Jennifer Daryl Slack proposes that the study of technology may be divided into two major areas: one of *mechanistic* perspectives on causality and the other of *non-mechanistic* perspectives on causality (Slack, 1984; Slack and Wise, 2015). The determinist approach to technology can be criticised by carefully examining whether technologies are isolatable objects, or the cause of change in society. It assumes that technologies have originate autonomously with self-generating force, which fails to realize the social and cultural context that the technology comes from (Slack and Wise, 2015, p. 121). One step past the mechanistic perspectives on causality advocated by determinism comes the proposition of soft determinism. It suggests that there is a *symptomatic causality* between technologies and social forces. The proponents of this idea believes that there is an “inevitable but limited range of effects ... inherent in the technology and that ... choices ... can be made within that inevitable range of options” (ibid., p. 123). The complexity added to *simple causality* to make it *symptomatic causality* affects the degree of intensity and the latter provides alternative ways to alter the situation. However, these two approaches do not question the autonomous nature of technology and treat the social forces and the technological forces as external to each other. In this way, the mechanistic perspective still accepts the idea of autonomous technology and the word “technology” refers to a discrete, isolatable, solid entity that comes into society from somewhere outside the familiar environment – but where this “outside” is, no one can explain.

In opposition to this perspective of mechanistic causality is the non-mechanistic perspective²², adopted by those who believe that technology is “already a complex set of connections, or relationships, within a particular culture” (ibid., p. 126). In other words, although most technologies have the form of an object, it represents only part of the

²² The non-mechanistic perspective, according to Slack, contains both *expressive causality* and *articulation and assemblage*.

technology. Technology is not an independent thing, but has always been closely linked to the existing environment. How the technology was invented, developed and even used within what particular set of relationships is in itself also an aspect of the technology. The technology “emerges from within a context, as part of that context” and is “effective within that context” (ibid., p. 127). From this perspective, the social and cultural are not events external to the technology; indeed, no particular component, whether cultural, social technological or other, stands alone.

Behind the *non-mechanistic perspective* is the essential point of the social construction approach, which stresses that science and technology are not natural areas but among the products of human knowledge. They are generated and transmitted in particular social conditions. From this perspective, to study such areas, researchers have to deal not only “with the empirical variety of ‘knowledge’”, but also “with the processes by which ... ‘knowledge’ comes to be socially established as ‘reality’” and “congeals” in human society (Berger and Luckmann, 1966, p. 3). By using the term “sociology of knowledge” (ibid.), they point out the double sense of knowledge: This means apprehending both objective social constructs and the ongoing process that produces the constructs (ibid., p. 62). For the same reason, the wider social structures which stress only the group dynamics of sociology fail to pick up how technology and materiality mediate the character of such relationships. The entanglement of humans and materiality cannot find a proper position or an analytical vocabulary in the traditional concepts of sociology. For example, the traditional division between “structure” and “agency” becomes much more complicated when dealing with technologies. Sociologists have found that the line “where human agency ends and some sort of nonhuman agency begins is not always clear”; similarly, the “boundaries between humans and nonhumans are often attributed or performed in the course of social life” (Bijker and Pinch, 2012, p. xix). Therefore, instead of considering the social structure as merely “the social container that somehow constrains social action” (ibid.), as argued by the Social Construction of Technology (SCOT), “social structure is itself material and technological” which “complexifies traditional analyses of social structure and power” (ibid.).

The study of infrastructure clearly shows the co-construction of technology and the social. The content of infrastructural service cannot be separated from its form; if it can, it is given another name. Since this thesis focuses mainly on electricity infrastructure as an empirical case, it will help to take the study of the electricity infrastructure as the main

example. As Gupta (2015) claims, electricity “has no existence in nature”; rather, “it is a purely artificial form of energy that can be produced from diverse sources like hydropower, nuclear fuel, or solar power” (ibid., p. 556). The special characteristics of electricity are concluded as “ubiquity” and being an “immaterial object” (ibid.). However, in my opinion, such characteristics help us to understand electricity and infrastructure in general better than other kinds of infrastructure that have a distinct “physical” and “material” base²³. In fact, the material and immaterial, natural and artificial characteristics of infrastructure cannot be distinguished from each other, especially when the infrastructure always works as a ceaselessly continuing process of circulation. Rather than saying that electricity needs a unique type of infrastructure, it is better to understand this uniqueness as the essence of all infrastructure, the co-existence and co-construction of technology and society (Edward, 2003).

Infrastructure is a Large Technical System (LTS) (Hughes, 1987; Hughes and Coutard, 1996) which is developed, operated and maintained as a socially constructed technology, but not only as a solely technological system per se. The development of any technoscience work involves different networks and systems. In other words, the success of a certain technological system is not only the result of its technical character, but partly the result of its social, political and economic context (Bijker and Law, 1992a). Hughes’s study (1983) shows that in designing their electric devices, entrepreneurs such as Edison also designed their society. This is why electrical devices could be successfully distributed. Following the study by Hughes, the studies of LTS prompted researchers to think about “how groups of innovations become linked together to (sometimes) gain the systemic qualities of networked infrastructures” (Graham and Marvin, 2001, p. 211). The interconnected large technical systems “tend to accrue in society on an incremental basis” and are “much more important in social development than individual innovations” (ibid., p. 181).

As Edwards concludes, the importance of LTS study has two main aspects. One is that heterogeneous nature functions across systems, the other is “individual infrastructures follow a life cycle, a development pattern visible only on historical time scales” (Edwards,

²³ Even for water infrastructure which has a physical form, water running out of a tap is different from water flowing in a river. The provision of tap water is an infrastructure based service, behind which there is an agreement between the provider and the user.

2003, p. 199). Therefore, the LTS studies always adopt a historical approach, although many of the historical studies do not go further than descriptive historiography, which is difficult to generalize beyond detailed historical narrative. The SCOT approach enables more aspects and factors than pure historical instances to be examined, for example, “aspects such as power or economic strength enter the description, when relevant” (Pinch and Bijker, 1987, p. 34). Some unsuccessful innovative technologies have also been studied, which have made scholars rethink whether the success of an artefact depends on a genius inventor, or is “an explanation of its subsequent development” (ibid., p. 22). In fact, it is just because scholars focus asymmetrically, preferring to study successful technological innovations and not failed ones. Consequently, not only has the focal point become the smooth development of technology, but also various obstacles and conflicts have shown “conflicting technical requirements by different social groups ... conflicting solutions to the same problem ... and more conflicts” (ibid., p. 35). These conflicts and problems are “not only technological ones but also judicial or even moral ones” (ibid., p. 39).

Normalisation of Technology and Infrastructure

Unlike researchers who focus on the various conflicts around the technological system, ordinary users usually conform to infrastructures. When people use infrastructural utilities and devices such as lamp-bulbs and air-conditioners, they pay little attention to either how the electric grid was built up both inside and outside the electrical devices, or how the utility service is managed and operated. Turning on the light means using a vast infrastructure including a generating, transporting and regulation system. What people care about are the functions of the electrical devices that are directly related to their daily lives. Most parts of the infrastructure system are invisible to their users, and this is how infrastructures exist for us. People cannot see them and even cannot realize that they exist, but people cannot live without them. We commonly treat infrastructures as substrates. Compared with the various electronic devices fed by electricity, the electricity system itself is transparent. As Star points out, “transparency” is one important property of infrastructure: “Infrastructure is transparent to use, in the sense that it does not have to be reinvented each time or assembled for each task, but invisibly supports those tasks” (Star, 1999, p. 381). This is either due to the complexity of the system, which makes it impossible for most people to know everything about it, or the fact that people simply

choose to ignore the system since they believe that knowing how infrastructure systems work makes no difference to their daily lives.

There are also various stages of infrastructural transparency, which encode and embed in our lives in several ways. To someone who is making his/her first journey by air, the travelling infrastructure is visible downstage, presented in the forms of the airport building, the aeroplane and all the services of the flight. But the users of other common infrastructure systems, such as electricity, or subways, which they encounter every day, seldom think about their existence, because they have already internalized them in their everyday experience. When strangers and outsiders encounter infrastructure, they treat it as a target object to be learned about. Outsiders study it in illustrated steps to acquire a natural familiar acquaintance with the infrastructure system. Once they finish the “induction training” in a particular infrastructural system, they become its members (Star, 1999, p. 381). The “infrastructural membership” reveals that although infrastructure is always presented in an objective form, such as wires, tubes and buildings, it has a manipulative aspect. This is not just because people prefer to ignore them; in fact, the wires and pipes are designed to be invisible in normal conditions. The secret ambition of the designers of infrastructure systems is that they should become invisible, ubiquitous, banal, to be taken up into a culture and absorbed into the background from which it should never enter the foreground.

Infrastructural transparency and membership indicate the normalisation and authorisation process of technology. It points to where answers can be sought to the question why a technology functions in the way it works in everyday daily life and makes people take it for granted (Sismondo, 2010). How does the knowledge from different systems compete against or conspire to normalize the matter locally and historically? This discussion often has much to do with the closure and stabilisation of a certain technology. From the perspective of SCOT, this process is seen as the question of “closure”. It involves the “disappearance of [the] problems” (Pinch and Bijker, 1987b, p. 44) that make the technology unstable. It is “the process by which conflicting groups reach (or impose) a specific outcome and so conclude the dispute” (Bijker and Law, 1992a, p. 13); “users and colleagues (human and non-human) act in ways which are unchallenging to the technology” (Hinchliffe, 1996, p. 665); and “the heterogeneous elements are coupled and interact according to their assigned roles, allowing the intended effects to be expected with high reliability” (Graham and Marvin, 2001, p. 183).

There are three key ways to describe how infrastructure closure has been reached in a particular historical period. From a Marxist perspective, this process can be expressed as commodity fetishism (Kaika and Swyngedouw, 2000, pp. 122–123). The infrastructure elevates resources such as water and electricity from earlier environmental and technical processes. By “blurring the socioenvironmental process of their production” and “foregrounding their character as universally exchangeable for anything else” (ibid., pp. 123), we users then treat the infrastructure and its service as commodities with no history or past. The relationship between the users and infrastructures becomes the relationship of consumers and products. From a cultural perspective, closure is reached “by redefining the key problem with respect to which the artifact should have the meaning of a solution” (Pinch and Bijker, 1987, p. 46). For example, one classic study shows that the adoption of air-filled tyres on bicycles was translated to the new problem of how to go as fast as possible, but not related to the hot debates on safety and ease of navigation (ibid., pp. 45–46). Adopting the cyborg approach, which emphasizes the material interface between the body and urban technological networks (Gandy, 2002, 2005), the physical infrastructure may be understood as an “exoskeleton” (Gandy, 2005, p. 28) for the human body. The city space where the human body is embedded has become a hybrid of machine and organism, which means that “urban infrastructures can be conceptualized as a series of interconnecting life-support systems” (ibid.).

Learning from the Social Construction of Technology (SCOT), the study of infrastructure acknowledges the importance of the social and historical process in producing a certain kind of technology. With the help of Large Technical Systems (LTS), it reveals the normalisation process of infrastructure in human life through a historical process. The normalisation of infrastructure indicates that technology may be redefined as a problem and solved in a widely accepted way by society. Rather than as neutral and objective matters, technological systems, such as infrastructure, should be treated as systems with the ability to adapt to the environment and contribute to the altering of the environment. In the next part, I extend the argument by examining what cultural and organisational change has been encoded in the implementation of technology.

Symbolic Meaning and the Organisational Changes through of Technology

After the discussion of the approaches to the question how technological systems entangle with the society, I move the discussion on to the effects of technology implementation.

As both a body of knowledge and a social system, the development of technology, with a particular focus on infrastructure in this research brings both cultural and organisational effects.

Mattelart (2000), positioning the study of communication networks in the historical and global context, shows that, in general, the early communication networks such as the railway, have much to do with the ideas of the 18th century Enlightenment and with liberal ideas that embrace the rational engineering of the world together with the free circulation of goods. Following this argument, which draws a line between technological development and cultural change, it is not hard to realize the domination of rationality, technology and science. What is represented by the development of science and technology is “a world order in which the immaterial workings of God and his spirits were subordinated to the power of science to rationally order and control the natural world” (Larkin, 2008, p. 7). This means that the world represented by technology and science has separated from the world represented by a god and immaterial workings. Following the laws of nature, the natural world should be controlled and regulated and it found to be controllable and capable of being regulated. With significant technological elements, Edwards argues, “to construct infrastructures is simultaneously to construct a particular kind of nature, a Nature as Other to society and technology” (Edward, 2003, p. 189). In other words, it is a nature conceived as a given.

“The ideology of progress and the legitimising scientific discourse of scientists and engineers” (Swyngedouw, 1993, p. 324) work as weapons to dominate the construction of the modern urban infrastructural ideal, which then makes it easier to capture and transform some less modern urban space. Although colonial expansion brought enlightenment ideas to the world outside the West, colonial orders were attached to the material products of these ideas. The cultural meaning represented by infrastructure is clearly shown in the form of the symbolic power of technology and rationality in the service of colonial orders (Mitchell, 2002). Infrastructure “represents an overwhelming sense of grandeur and awe” (Larkin, 2008, p. 7), serving the civilizing promise of colonial technical superiority. Therefore “the construction of complex technological projects” is commonly seen as part of the spectacle of “superiority and power of colonial rule” (ibid., p. 247). The building of the railroad and the power grid was undeniably intended to move goods and provide energy, but it was also “a mode of address whereby the colonial state

offered development and technological progress in return for political subjection” (ibid., p. 244).

Nowadays, in the post-colonial era, the infrastructural symbolic power still exists, but it has been given new meanings. For example, the representation of citizenship and belonging is embodied in the infrastructure system. By studying the prepaid electricity meter in late-apartheid South Africa, von Schnitzler (2013) argues that the infrastructural device helps to form “a graduated social contract by which citizenship is de facto mediated on an administrative terrain” (ibid., p. 682). Therefore, in both moments, the infrastructural device shows “the ability to delegate protracted ethico-political questions – of belonging, civic virtue and indeed the limits of citizenship – to a technical terrain” (ibid.). In other cases, the infrastructure and spatial transforming are sometimes due to the embodied symbolic power which, “evacuated of any real meaning and infrastructures themselves, became repetitions, devoid of substance” (Larkin, 2008, p. 244). From the study by Andrew Apter (2005) of the period before the collapse of the Nigerian oil economy, it can be argued that, instead of having utility functions, large technical systems work as translation mechanisms to transform the oil revenue into a technical spectacle. Infrastructure and the transformations of space then become pure symbols of wealth. Therefore, when the oil economy collapsed, it revealed that vast numbers of infrastructural spectacles are still uncompleted.

Besides the symbolic meaning embodied in the infrastructure is also the organisational change to the environment brought by the construction of infrastructure, which it embeds within itself. From the perspective of urbanists, infrastructural networks are explained as the mechanisms through which the relationships between individuals, local communities and the central state are reorganised: “Across the urban world, fragmented islands of infrastructure were joined up, integrated and consolidated toward standardized, regulated networks” (Graham and Marvin, 2001, p. 40). Starting from gas provision and then the electric grid, individual households were tied together and to infrastructure as a new collectivity (Larkin, 2008), which was not organised in the same way as the local community had been. Since then, infrastructure has linked “the domestic and intimate to larger structures of capital and the state” and “represent the intrusion of capital and then government into everyday life” (ibid., p. 243).

Therefore, not only hardware, but also legal, corporate and political-economic elements must be included in the discussion of infrastructure. Comparing the nuclear power plants

and solar energy, Winner (1980) comments that “some kinds of technology require social environments to be structured in a particular way in much the same sense that an automobile requires wheels in order to run” (ibid., p. 130). Later, in the same study, Winner argues that for intractable technology, whose regulation involves huge efforts of coordination, it may be unavoidable to link the technology to “particular institutionalized patterns of power and authority” (ibid.). Taking Edwards’ example (2003), the stage of diffusion always entails a “consolidation phase” of technology, during which “any remaining independents convert to the established standard”, “and create a unified infrastructure, sometimes in the form of a public or quasi-public monopoly” (ibid., p. 199). When “chaotic completion becomes organized around a relatively stable system”, on the one hand, it “reduce[s] the risk to manufacturers and the cost to consumers, thus increasing the dominant system’s overall momentum” (ibid.). On the other, it almost inevitably goes hand in hand with “the submergence of individual and local communities beneath the imperatives of state and corporate power” (ibid., p. 200). Moreover, scientific and technological practice may usher in a wholly centralized power and authority in a society dominated by “high-modernist ideology” (Scott, 1998), which refers to the “faith” and “legitimacy of science and technology” and even “the rational design of social order commensurate with the scientific understanding of natural laws” (ibid., p. 4).

Supported by the Social Construction of Technology (SCOT) and Large Technical System (LTS) (Bijker, Hughes and Pinch, 1987; Hughes, 1987; Pinch and Bijker, 1987a; Bijker and Law, 1997; Bijker and Pinch, 2012), the non-mechanistic and co-construction perspective of infrastructure in this thesis raises the idea that technological innovation and immaterial orders are not external to the environment in which the social and the technical are formed. A historical and heterogeneous perspective should be adopted by researchers on infrastructure, since it is suggested that infrastructures as Large Technical Systems (LTS) consist not only of technological innovations, but also of social, legal and political systems. How a particular technological innovation has been normalised in the human society needs to be studied in ways beyond mere historical description. Researchers must consider the social forces competing with each other, the symbolic meaning embodied in the object forms of utilities and the organisational change within which all of us as human actors are embedded. What this entire section seeks to suggest is that the infrastructure which we encounter every day is not something that can be taken for granted. Instead, there are always choices and contingencies, whether or not they can be seen on the surface. Through denormalizing and denaturalizing the infrastructure

system, the study of infrastructure should aim at revealing the substrate of the power dynamics in play. In the next section, I discuss the infrastructural power dynamic within the scope of critical urban theory, which has special concerns with the spatial implications of infrastructure from the perspective of political economy.

2.3. Capitalism and the Spatial Dimension of Infrastructure

A co-construction relationship between the technical and the social was suggested in the previous section. The social and the technical are not considered as facts external to each other; instead, they are formed from within the same environment. Unlike single technological appliances, one of the important characteristics of infrastructure is its vast connectivity, which allows resources to be distributed and different factors to work together, with an impact of the entire system across a wide geographical range. It should not be forgotten, either, that the construction of infrastructure is interwoven with the production of the urban landscape and the reconfiguration of modern cities. Therefore, we should not lose sight of the spatial dimension of infrastructural dissemination.

Drawing on critical urban theories (Harvey, 1985, 1996; Lefebvre, 1991; Massey, 1991; Swyngedouw, 1993; Kaika and Swyngedouw, 2000), this section discusses the spatial implications of infrastructure. Following the idea argued in the last section, the impact of technological systems on the city is more than the impact of dead material. I first discuss the local and global effects in considering how infrastructural technical systems reorganise space. Second, I ask how urban space may be understood as a competed platform for capitalist political economy. The last point starts from the “contradiction” of infrastructure on the one hand as an instrument to support the capitalist ideal creating a space-less world (Swyngedouw, 1993; Harvey, 1996) and, on the other, the fixity of the infrastructure itself which creates obstacles to further circulation. In this way, it suggests that the materiality of infrastructural space equally facilitates and hinders the capitalist circulation. This idea then leads this study to a sub-section which focuses on the political capacity and technological materiality of infrastructure.

Infrastructure and the Changing Perception of Time/Space

Providing various utility services (transportation, water and power supply, etc.) to users, infrastructure systems are perceived as massive technological networks mediating modern urban activities. What we are experiencing and conceive as “reality”, is more or

less mediated by infrastructural networks. In accordance with the network society which “scripts the city as a process of flows” (Kaika and Swyngedouw, 2000, p. 120), it is in fact supported by infrastructures. How does infrastructure moderate the changing perceptions of space and time converging at the core of this idea? In the next paragraph, I review the literature about the changes in time and space perception in relation to the development of infrastructure networks. On the basis of this changing situation, instead of taking a container view of space, this review takes the relational approach provided by critical urban theories (Harvey, 1969, 1996; Massey, 1991), which argue that space is measured through events and relations but not through the physical distance. This argument further affects the problematics of scale in rethinking the local/global dichotomy.

Due to the development of infrastructure varying from the transportation of people to information, as one example, concerns with the compression of time and space and its accompanying social and economic process has had substantial attention from scholars. The perception of time and space changed as soon as infrastructure could connect scattered people and enable the functioning of each point to circulate. Like blood circulation or the nervous system mentioned in the “exoskeleton” metaphor (Gandy, 2005), in this bodily economy, infrastructure played the role of veins and arteries along which vital elements were distributed round and round. Similar arguments claim that infrastructures, such as roads, canals, railways, form networks, as instruments of power to link scattered people together. The famous claim by McLuhan (1964) suggests that the development of media such as television would produce a global community.

What the above claims all suggest is the intermediacy of infrastructure systems in affecting the human perception of time and space. The historical study of transportation, for example, the fast movement of trains and their destination oriented route design, in some way, detached travellers from the landscape that they were crossing. A passenger perceives only two points in this journey, the starting point and the destination. Therefore, viewing the landscape is like viewing it from a “theatre” (Schivelbusch, 2014)²⁴. The

²⁴ The original work is written in German, by Wolfgang Schivelbusch, *Geschichte der Eisenbahnreise. Zur Industrialisierung von Raum und Zeit im 19. Jahrhundert* (Frankfurt am Main, Ullstein, 1977). The work cited here is the English version published in 2014.

perception of time and space is thus no longer continuous. Alain Gras (1997)²⁵ also suggests that the creation of large technical systems, such as railway, electricity and telecommunication system, is the creation of artificial space based on the tracks, the electrical wires and radio waves. Energy, information and people are redistributed in this world according to artificial time-space rules. “Whilst excluding smaller intervening centres from access” (Graham and Marvin, 2001, p. 202), extreme cases, such as aeroplanes and High Speed Railway (HSR), speed up the mobility between specific places, but isolate passengers from the place that they are passing by.

The new perception of time-space is not the end of such change. People connected to the LTS are included in such change and have adapted a “modern” way of connection. Those who were cut off from modern technologies are excluded from the new time-space connections. It seems that Euclidean space is no longer applicable and the distance between the centre and the periphery is not determined by physical distance. Instead, what matters is how two points are connected. It is a topological understanding of space.

Through the discussion of distance measurement in David Harvey’s early work, we see the relational consideration of time and space. The relative conceptions of space show that “activities and objects ... define spatial fields of influence” (Harvey, 1969, p. 208). Meanwhile, an external viewpoint from which to assess and measure distances is abandoned. As Harvey argues, distance “can be measured only in terms of process and activity” (ibid., p. 210). Without activity, it makes no sense to measure a distance. Therefore he concludes that “such a concept of distance is purely relative.” (ibid., p. 211-212). Behind the “relative distance” is revealed the dictum that spatial properties cannot be distinguished from objects “in” space (ibid., p. 191):

“Thus space is no longer something which can encompass our perceptions of the world. It is, rather, a collection of measures determined by those perceptions. If space and matter can no longer be effectively separated and if the properties of space can no longer be regarded as a given priori, then the logical justification for the particular view of geography adopted by Kant, Hettner and Hartshorne can no longer be sustained” (ibid., p. 212).

²⁵ Cited in Vleuten 2004. The original work is written in French, by Alain Gras, *Les macro-systèmes techniques* (Paris, P.U.F., 1997).

Like the “relative distance” argued by Harvey, ideas about “time distance” are confirmed by Massey (1991). It is said that “if places can be conceptualised in terms of ... social interactions ... then ... these interactions themselves are not motionless things, frozen in time. They are process” (ibid., p. 29). The infrastructure provides historical layers over time by connecting new networks to the previous ones, or bringing the historical layers up to the present. “At any one point urban space is made up of the historical layering of networks connected by infrastructures” (Larkin, 2008, p. 6). As Henri Lefebvre (1991) argues, such historical layering “makes space seem flakey like a mille-feuille pastry rather than homogenous and discrete” (ibid., p. 86). The “mille-feuille pastry” idea links the history of a particular place through a physical form of infrastructure, which hence explains “why dormant cultural, religious and economic forms can suddenly gain purchase again, reawakening and becoming reenergized in a new situation” (Larkin, 2008, p. 252).

On the basis of the above changing perceptions of space and time, we need to rethink what defines a place and how to study a place. It is not a particular location and moment in time that define the characteristics of places. From a relational perspective, places can be imagined as “articulated moments in networks of social relations and understandings, which are constructed on a far larger scale than what we happen to define for that moment as a place itself” (Massey, 1991, p. 28). Moreover, “each place is the focus of a distinct mixture of wider and more local relations” (ibid., p. 29). Following Massey’s view of space, the effect of time-space-compression brought about by the always intensive infrastructural connection is not restricted by an objective utility form at any moment, but has already extended over the planet. It must be emphasised that globalisation and time-space-compression do not necessarily lead to the disappearance of the uniqueness of a space. “What gives a place its specificity is not some long internalised history but the fact that it is constructed out of a particular constellation of social relations, meeting and weaving together at a particular locus” (ibid.).

These arguments draw attention to the question of the way in which networks enact the realignment and reformation of the local and non-local. It then draws the researcher’s attention to the process of localization and delocalization. If we could pinpoint the frontier where the flow from the local meets the flow from the non-local, this would be a good platform to start further discussion. In *Friction: An Ethnography of Global Connection*, Tsing puts the discussion of rainforests business of Indonesia in the framework of “global

connection” and “local struggles”. In her work, the global is “not a claim to explain everything in the world at once” (Tsing, 2005, p. ix). Instead, the free motion provided by global connectedness has no way to escape from the influence of “local empowerment”, which is considered as “spatially far-flung collaborations and interconnections” (ibid.). Further, she argues that “cultural diversity is not banished from these interconnections” and therefore, that “[c]ultural diversity brings a creative friction to global connection” (ibid., p. x).

It is not advisable to set up boundaries for such collaborations, since there is no pre-determined categorisation external to a particular place. As Harvey argues, since space is a series of “relations derived from processes and events” (Harvey, 1996, p. 252), the study of space should move from space itself to the process which gives rise to a particular space. In his words, it is “how things are separated and bound together ... [that] becomes the focus of attention” (ibid., p. 258). There are various “levels” of geographical scale, such as the domestic, local, national and global, which are used to delineate aspects of spatial organisation. However, that the scales are constructed should not be taken to imply that they are universally static (Marston, 2000; Marston and Smith, 2001). Therefore, the geographical scale should not be treated as a set of given categories for use as an analytical unit. Instead, rather than scales per se, analyses should focus on the realignment and reformation of scales, or the way that the scales are fixed and retained.

The discussion of geographical scale does not only stay at an ontological level. It also carries further implications for empirical studies. For example, Marston (2000) argues that it is necessary to enlarge the understanding of scale “to include complex processes of social reproduction and consumption” (ibid., p. 219) in geographical applications of scale. In this way, individuals, households and neighbourhoods, where everyday decisions are made, may be included in a geographical discussion. The broadening discussion of geographical scale helps break through the dichotomy between global and local, which are connected by the ever complicated inseparable infrastructural systems. In this case, the local is not the opposite of the global; instead, the local becomes the global when the global enters the local.

Uneven Urban Development from a Political Economy Perspective

It has been discussed that infrastructure has social, cultural and spatial implications. However, besides neutral implications, does infrastructure have political ones? With the

help of political perspectives, the analysis of infrastructure and urban construction gains an ethical and political dimension. Critical urban theories suggest that urban infrastructure networks not only embody power relations. At the same time, they are also terrains for capitalist production (Harvey, 1985, 1996; Swyngedouw, 1993; Graham and Marvin, 2001). Highly uneven political and economic struggles occupy the agents concerned, including the state, individual households, private firms, the public sector and technical engineers.

The nature of capital and capitalism holds a central position in critical studies of infrastructure and urban space production. As a mode of production, capitalism has the central aim of building a world with no spatial obstacles that would support and accelerate the course of capital accumulation (Harvey, 1996). This idea is then developed further by focusing on the “mobility” supported by infrastructure, which provides the “arenas in which the struggle for control and power is fought” (Swyngedouw, 1993, p. 324). Setting up new communication infrastructure to facilitate mobility, such as transportation and information infrastructure, is not a neutral process when it is dominated by private approbation and the process of commodification. Similarly, the changing perception of time and space (discussed in the last sub-section), inevitably touches upon “the struggle for maintaining, changing or consolidating social power” (ibid., p. 305).

Sometimes, while facilitating a certain kind of connection between spaces, infrastructure can also divide spaces and undermine other kinds of connection. This is the social bias produced by the uneven development of infrastructure when motivated by the logic of capitalism. “The exclusion of some social groups from access to commodified information and hence to the power embodied in commanding information and information flows has produced a new class of underprivileged” (Swyngedouw, 1993, p. 323). The study of splintering urbanism (Graham and Marvin, 2001) argues that the unbundling of infrastructures, reinforced by powerful factors and supported by powerful coalitions of actors, allows for bypass strategies. Such strategies, for example, prefer to build up connections between “valued” or “powerful” users and places and at the same time bypass those that are “non-valued” or “less powerful”. By adopting these bypass strategies, on the one hand, some “premium networked spaces” (ibid., p. 249) emerge, where elite or higher-income groups live. On the other, the disconnected places are then “withdrawn from the wider urban fabric” (ibid., p. 288), which leads to an ever widening

gap that “limits a person or group’s ability to extend their influence in time and space” (ibid.).

For example, the study of electricity infrastructure dissemination, by adopting a prepayment technology, raises the question of how to balance infrastructure ownership and the right to have access to energy. Originating in the 19th century era of liberal Victorian liberalism, the “penny-in-the-slot meter” (mentioned in the last section) is an automatic device allowing access to electricity in line with the payment. The prepaid technology is treated as the “technical solution” to the crisis of non-payment of electricity (von Schnitzler, 2013). Compared with monthly paper bills which allowed users to delay their payment until they could afford it, prepaid meters allowed no room for negotiation. By adopting prepaid meters, it made possible “the integration of the whole city within a networked grid” and simultaneously “divided its population into two sets” (von Schnitzler, 2013, p. 677). Similarly, after such devices were brought to South Africa, von Schnitzler goes on, people who were not able to pay the energy fees automatically were disconnected from the city’s electricity flow. With the support of such devices, the electricity grid was able to serve poor areas, but it did not necessarily provide the access to power.

Behind the adoption of a technological device, what can be seen here is the liberalisation of infrastructure. What the infrastructure networks provide is no longer included in the public goods and services that everyone should have equal access to, but transformed into commodities access to which depends on the users’ ability to pay. The production and exchange of infrastructural services is heavily influenced by the market. Following this logic, it may be argued that, with the help of technological development infrastructural services that can be controlled quickly, easily and accurately, “uneven” urban development is encouraged. As a result, although the power grid has extended throughout the city, forming an integrated infrastructural network facilitates nothing. Rather, it couples the topological definition of space (discussed in the first subsection of Section 2.3), with a clear means of setting on and off conditions to the network.

However, it is still not the time to confirm whether it helpful or not to have this liberalized and less integrated infrastructure network, since it is hard to ignore that the fragmented networks are able to deliver appropriate services “in a more diverse and flexible manner than homogeneous public monopolies” (Graham and Marvin, 2001, p. 136). From the perspective of splintering urbanism, instead of denying the positive contribution of technological infrastructure, it provides a new focal question for us to think about: With

the help of technology and infrastructure, how do the most marginalised groups, such as the poor, the disabled, ethnic minorities, gain the ability “to negotiate energy, transport and communications services within markets that might be specifically tailored to their needs” (ibid., p. 136)?

As technological development changes cities and infrastructure networks to “smart” and “live” ones, city regulation is replaced by instant feedback, remote control and automatic action. Going back to the study of payment technologies, von Schnitzler (2013) also discovered that “prepayment technology became closely bound up with distinctly modern moral anxieties about the blurring of human and machinic agency” (ibid., p. 679). The redistribution of agency between the human and the meter is, in fact, the co-construction of meters and their users in the liberal context dealing with agency, responsibility and concomitancy. Consequently, “the technology itself became the terrain on which the ethical and political questions were negotiated” (ibid.). The tools, devices, machines and infrastructures, inevitability entered the sphere of public discussion through the intensified infrastructural interaction. Consequently, the users, who were treated as passive actors dominated by the infrastructural systems and privileged groups, got a chance to compete for further participation, through the multiple and customised grids. Indeed, techniques of by-passing meters, using tokens other than coins and breaking open the box in which the coins were collected, became common at certain times. This suggests that we should be “sensitive to the subtle, capillary reach of networked infrastructures” (Graham and Marvin, 2001, p. 189).

In this section, the infrastructure is understood as a physical articulation of the uneven distribution of power in society. From the perspective of critical urban theory, the vast expanding infrastructural network is motivated by the capitalist desire for a world with no spatial barriers. Therefore, as we see that, along with the time-space compression facilitating the motion of capital, people and goods, we also see the parallel expansion of fragmented, unevenly produced infrastructure networks. A political economy approach to probe how power is unequally distributed to support the privileged group and undermine subordinated groups can be applied.

However, the development of infrastructure *per se*, especially with the improvement of technological devices, highlights the contradictory relationship of infrastructure to capitalist production. While the infrastructure network “reduces the friction associated with distance and other space-sensitive barriers”, as Swyngedouw argues, “such

transportation and communication organisation can only liberate activities from their embeddedness in space by producing new territorial configurations [and] by harnessing the social process in a new geography of places and connecting flows” (Swyngedouw, 1993, p. 306). In other words, the facilitator, here the infrastructure itself, is inevitably fixed and embedded in the space produced. As a result, “liberation from spatial barriers can only take place through the creation of new communication networks, which, in turn, necessitates the construction of new (relatively) fixed and confining structures” (ibid.). No matter whether traditional infrastructure networks such as roads, wires and ports, or wireless infrastructures such as radio and telecommunications networks are the subject, they are “rooted in large immobile patterns across particular territories” (Graham and Marvin, 2001, p. 193). This inflexibility of the infrastructure and the space-less desire of capitalist production are mutually contradictory. “Crises emerge where older infrastructure networks, which are embedded in space, become barriers to later rounds of capitalist accumulation” (ibid., p. 194). This last point highlights the materiality of infrastructure which produces an inherent barrier or “self-barrier” to capitalism production. In the next section, I take a closer look inside technology and infrastructure, from which I explore what kind of competitive space is provided by infrastructure. This is also where the political capacity of infrastructure is located.

2.4. Contingent and Competing Infrastructure

Aware of the trap of determinism/soft determinism based on the fact that society has limited agency to adapt to technological innovations, the previous section provided an answer which revealed the social and political forces that shape technology and charge it with fulfilling a particular purpose. However, it is also important at the same time to avoid treating technology as a universal standard instrument obeying social and political forces. This is not simply to say that both technological and social forces have an impact on each other. In fact, the word “impact” inevitably shows entails that technology and society must be autonomous systems and external to each other. Holding a co-construction perspective of view²⁶, it is important to keep the co-evolution of both as the core. In this section, rather than simply treating technological innovation as an external instrument to

²⁶ By using the prefix “co”, I want to suggest a non-distinction view. I want to avoid splitting the world into technology and society by using a pair of perspectives that reveal and work with different aspects.

attain a political economy goal, by emphasizing the materiality and ambivalence inherent in technologies, I argue that infrastructure has the potential to be a terrain of competition and resistance.

I shift the focal point from the political economy power dynamic at the macro level to the daily encounter of the actors concerned from human to the non-human micro level, including individuals, local communities, technological devices and relevant policies, etc. The discussion starts from the “self-barrier” infrastructure (see Section 2.3), which refers to the question why older infrastructure becomes a barrier to later rounds of capitalist accumulation. This question is answered in terms of material objects congealing time-space and facilitating the remote encounter of various actors (Latour, 1994). Therefore, the infrastructure is not only advocating the capitalist desire for a space-less and distance-free world (Swyngedouw, 1993; Harvey, 1996), but at the same time is producing an infrastructural space that uneasily fosters competition and negotiation. By giving credit to infrastructural materiality, it blurs the boundary between human and non-human users of technical devices and the infrastructural system. It views the infrastructure as an ever expanding heterogeneous system. From this perspective, the second part of this section argues that what is defined as the social context is not a set of pre-determined categories, but is self-built in the course of building an infrastructure network. Therefore, instead of determined causal effects, contingency originates from socio-technical assemblages of infrastructure. Third, supported by the above views, we are then able to examine the situational interaction of habits of use, engineering work, small technologies, occasional amendments, contributing to the contingent, competitive and participatory infrastructure.

Infrastructure as Ever-expanding Heterogeneous Network

An important property of infrastructure concerned with materiality is its “installed base” (Star, 1999; Bowker and Star, 2000). Infrastructure runs along the installed base, wrestles with the inertia of this base and inherits strengths and limitations from it (Bowker and Star, 2000, p. 35). The construction of infrastructure does not start from nothing. For example, when building up a new electricity system at this point in history, it must be, more or less, based on the support of the old system. It may, for instance, add one more power supply wire to an old system, or it may keep the trajectory of the old wires, or use another power station as its new input. It is unlikely to abandon the old system and set up something brand new. Even a place with no previous electricity system prefers to build

the first wire alongside roads that cross villages, since the direction of the roads shows how the households in the village are connected. The construction of infrastructure is inseparable from historical and material bases. Infrastructure is not an abstract concept, but consists of the specific operation of steel, copper, spatial patterns, technical standards and ultimately social norms.

In Latour's philosophy, "[t]hink[ing] of technology as congealed labo[u]r", material plays a very important role in presenting and preserving the social order, (Latour, 1994, p. 40). The way in which time, space and actors are inscribed in the objective forms is treated as "a fresh hybrid that carries past acts into the present and permits its many makers to disappear while also remaining present" (ibid.). This means that in the present technical form, several types of actants are inscribed, which may or may not have met before. Thus, mediated by technology, especially with its material base, "we hourly encounter hundreds, even thousands, of absent makers who are remote in time and space yet simultaneously active and present" (ibid.). Following this idea, what is commonly known as now and present is in fact an experience from another time and other spaces, whose existence may not even be traceable. This is in accordance with Lefebvre's argument of the city's historical layer and the metaphor of mille-feuille pastry (see Section 2.3).

Water pipes, electricity wires, optic cables are all objects that create the fields along which other objects, such as water, electricity and information function. An infrastructure, therefore, is an ever expanding techno-social system with the characteristics of various actors congealing as objects, but at the same time circulating as objects by being provided with a ground where they can operate. As networks, infrastructures make possible the movement of other matters and makes them into "things and also the relation between things" (Larkin, 2013, p. 329). The so called "things" are the mixture of inseparable relationships between human users and technical devices. Taking the supply of electricity, for instance, while electric wires are of course part of the hardware that transports electricity to each power point, such as private houses or electrical devices, the wires will not carry any electric current without the continuous cooperation of resistance with a certain voltage. This shows that only when voltage and resistance co-exist is formed the properly working infrastructural system. If we translate this process by showing the actors involved, it means that the electricity infrastructure can operate as it is designed to do only if someone is using electricity. In this way, the voltage and the resistance both become part of the electricity infrastructure. For the same reason, the electrical appliances

that influence the voltage by their resistance, whether they are private or public appliances, of high or low wattage, are also part of the electricity system. By the same token, people who are responsible for the operation and maintenance of all the hardware are also included in the system. Anyone or anything that is connected to this system is related to and influenced by all the others.

The boundaries of what may be counted as infrastructure have been blurred and expanded in this way. Everything may be considered a constituent of one kind of infrastructural system as long as it is relevant to this particular resource. These constituents rely on and contribute to the system; they are interrelated with each other. When the particular resource is needed, they connect and form a network. Moreover, different infrastructure systems interweave with one another. Once infrastructure networks are successfully built, unconnected “things” can be linked and work collectively. In this way, an infrastructure system, the electrical power grid, for example may be considered as a network, a complex assemblage (Bennett, 2005; 2010, p. 24) that brings all manner of human, nonhuman and natural agents into a multitude of continuous liaisons across geographic space²⁷.

For example, the work by Aibar and Bijker (1997) frames the city as a heterogeneously engineered “enormous artefact”, which is a “powerful tool in building new boundaries between the social and the technical and, therefore, in building new forms of life” (ibid., p. 23). The most important contribution of their research is that it indicates the direction of what should be counted as a “fruitful basis for investigating the politics of technology” and therefore an “enriching perspective for the understanding of the sociotechnical”

²⁷ Here I borrow Jane Bennet’s idea of electricity infrastructure as assemblage to emphasise the heterogeneous and contingent nature of this infrastructural system in the following paragraphs. Bennet has a more detailed five-point definition of assemblage, for reference: “an assemblage is, first an ad hoc grouping, a collectivity whose origins are historical and circumstantial, though its contingent status says nothing about its efficacy, which can be quite strong. An assemblage is, second, a living, throbbing grouping whose coherence coexists with energies and countercultures that exceed and confound it. An assemblage is, third, a web within an uneven topography: some of the points at which the trajectories of actants cross each other are more heavily trafficked than others and thus power is not equally distributed across the assemblage. An assemblage is, fourth, not governed by a central power: no one member has sufficient assemblage. An assemblage, finally, is made up of many types of actants: humans and nonhumans; animals, vegetables and minerals; nature, culture and technology” (Bennett, 2005, p. 445).

(ibid.). It is argued that the first step is to avoid the usual view of “technology as a mere medium or instrument through which power is mechanistically exercised” (ibid.). Instead of examining the socio-technical power relation “from a simple power equation of who has the loudest voice,” this study adopts “a set of situationally specific compromises resulting from a set of micro-struggles”, which then enable this research “to escape notions of technological ‘impact’” (Coutard and Guy, 2007, p. 718).

Similarly, by providing a situated account of water pipe leakage in the city, Anand, (2015) argues that these unaccounted flows of water are subject not only to the political regimes of humans, but also to “the politics affected by the materials and histories of the city’s water infrastructure” (ibid., p. 308). It is also suggested that a “distinct disciplinary tradition that addresses urban research and technological development” (Hommels, 2005, p. 344) should be brought together to form an interdisciplinary approach in order to explore the topic. It shows that since “STS concepts pay attention to both the social shaping of technology (or here, spatial artefacts) and the technological shaping of society”²⁸ (ibid., p. 329), they may be more fruitful than “traditional sociological concepts” (ibid.) for analysing the built environment. Rather than treating infrastructure practice as a set of standard procedures, with such useful tools as “interpretative flexibility, actor networks and black boxing” (ibid.), researchers can take a closer look the way that actual producers, such as planners, designers and engineers situationally interact and negotiate with material objects.

Infrastructural Contingency

Accepting the idea that the social, economic and political elements work together with the technological elements in a heterogeneous network, the actor-network-theory (ANT) approach takes us one step forward by avoiding the assumption that any of the social, economic, political, or technical elements are steady backgrounds upon which other elements are built. Instead, the approach implies that the background/backdrop is self-built “in the course of building a network” (Bijker and Law, 1992a, p. 13). Therefore, rather than “naturally occurring categories”, such as people, machines or entrepreneurs, all actors are treated as human or nonhuman actants. Regarding what “determines” human and non-human actors, it is argued that the boundary “comes to be seen as a consequence”

²⁸ In the work of Hommels (2005), STS here refers to science, technology and society studies.

of interactions rather than “something that determines it” (Akrich, 1992, p. 206). In other words, there is no pre-determined boundary between machines and people. “Almost everything is negotiable: what is certain and what is not; who is a scientist and who is a technologist; what is technological and what is social; and who can participate in the controversy” (Pinch and Bijker, 1987a, p. 26). This is in accordance with the “cultural articulation” perspective, which treats culture “as being made up of myriad Articulations (intermingling elements, connections, relationships) that make some things possible, others not” (Slack and Wise, 2015, p. 132). This adds a contingent feature to the assemblage consisting of the web of articulations, through which technologies are made and diffused.

By setting up both human and nonhuman actants with non-deterministic agency, we turn the central question of ANT into “how network associations between different actants can describe and explain the development of socio-technology” (Bijker and Pinch, 2012, p. xx). In other words, if it is not understood as a causal relationship, how may the effects generated from such a heterogeneous network be understood? Inspired by the work of Hanna Arendt, Jane Bennet suggests that distinguishing “cause” from “origin” may help to find an answer. As Arendt argues, the elements of totalitarianism form its origins but do not cause the totalitarianism. Things become the origins of events “if and when they crystallize into fixed and definite form” (Bennett, 2010, p. 33). “Shi²⁹, ... the style, energy, propensity, trajectory, or élan inherent to a specific arrangement of things” (ibid., p. 35), is an example given by Bennet to illustrate “the dynamic force emanating from a spatio-temporal configuration rather than from any particular element within it” (ibid.). The origin is where the force or the agency lies. However, when it has a definite form, its origin may be traced backwards only. This is what Bennett says: that the definite form “illuminates its own past, but it can never be deduced from it” (ibid., p. 34). Similarly Latour argues that there is no need to look for an external and global cause of a network, since it is only when “a stabilized network is already in place” that anyone “is capable of explaining the effects of causes” (Latour, 1991, p. 130).

As “vast collectivities of social and technical actors blended together” (Graham and Marvin, 2001, p. 185), infrastructural networks do have effects. But unlike deterministic

²⁹ Shi is a Chinese word, the original character being “势”.

causal forces, infrastructural effects are full of contingency, through which “new spaces and times and new forms of human interaction, control and organisation are continually (re)constructed” (ibid., p. 187). This is the active perspective of infrastructure, which argues that there is a space for contingency and the familiar “stable” infrastructure is merely a phased outcome³⁰. Since there are no fully pre-determined systems shaping the technological system, every element of the infrastructure assemblage is constantly shaping and being shaped by the others to a greater or lesser extent and in different ways.

In other words, since society and technology “are not two ontologically distinct entities but more like phases of the same essential action”, it is explained, “we might call technology the moment when social assemblages gain stability” (Latour, 1991, p. 129). By the time that technological innovation is applied, it “is deeply transformative, unmooring peoples’ sense of space and time and the speed of everyday life” (Larkin, 2008, p. 248). However, with its phased outcomes, the stability of infrastructure needs constant maintenance, otherwise it collapses. The instability is rooted in the materiality of infrastructure, such as the “physical contingencies of rain, harmattan^[31] winds, poor repair, theft and so on” (ibid., p. 250). In accordance with the explanation of the “unstable” nature of the technological system discussed above, what we experience everyday with infrastructure is its “varying degrees of stability” (Hinchliffe, 1996, p. 664). The level of stability/instability depends on how good and extensive is the maintenance that a technological work may receive.

When constant maintenance is lacking, the importance of infrastructure systems comes into focus. Opposite the process of “black boxing” is the process of “un-black boxing”, through which “the complex system and technologies ... which are ... only penetrated by specialist engineers and policy makers, are suddenly clearly revealed” to all the actors concerned (Graham, 2010, p. 18). Therefore, moments or locations of infrastructure interruption work as methodological entryways for us to investigate the social, political and material forces behind a properly operating system. Disruptions and collapses bring

³⁰ This argument is in accordance with the “normalisation” and “stabilisation” of technology argued in 2.2. It considers the technology not as something applied to society, but a socio-technical articulation that grows from within society, a process outcome to solve a certain problem. Therefore, analysing the normalisation and stabilisation process of technology is much more important than analysing the “innovations” of technology alongside it.

³¹ One of the climate features of Nigeria.

the environment's "backstage" events momentarily to the "front [stage]" (Goffman, 1959). This provides a method of approaching the infrastructure as a whole rather than the objects carried along it.

Like the proposal for the "un-black boxing" of infrastructure, a concept called "Reverse Salient" in the study of Large Technological Systems (LTS) in the 1980s, especially the study of electricity infrastructure, was what Hughes focused on. The term "Reverse Salient" was first used to identify a section of an advancing battle line which is "continuous with other sections of the front, but which has fallen behind or been bowed back" (Hughes, 1983, p. 79). The bowed back, in the military front, somehow equals the struggle. Its meaning is related to "disequilibrium" or "bottleneck", but, more than these terms, "reverse salient" refers to "an extremely complex situation in which individuals, groups, material forces, historical influences and other factors have idiosyncratic, causal roles³² and in which accidents as well as trends play a part" (ibid.). They are the point at which crucial components fall behind or are pushed out of line when another part of the system is expanding and working properly. The occurrence of the reverse salient moves the focal point of LTS studies from the contextualized social forces shaping or shaped by the technological system, to the operation of the system itself, where the invisible and unpredictable origins of the "varying degrees of stability" are located.

For example, in water infrastructure studies, water leakages pinpoint where the "reverse salient" is. Knowledge about leakages, as well as strategies for dealing with them, plays a significant role in maintaining the proper operation of the tap water system and perceiving its overall situation (Anand, 2015). Like the contingent natural forces, leakages are often beyond the institutional control of the very municipal departments that have designed and managed these water systems. Only the users and engineers who encounter the water pipes every day have the situational knowledge to maintain the system within certain acceptable degrees. Gradually it is realized that the contingency to the infrastructure has revealed the situationally involved actors, such as individual users and grass-roots-level engineers, together with the strategies they use. In the next section,

³² The "causal roles" here do not refer to causal relations between one factor and another. In fact, the whole sentence extracted from Hughes's work addresses the "causal forces" of all the relevant factors in "an extremely complex situation". Therefore, the meaning of the sentence is in accordance with the previous sense "origin" rather than "cause".

I discuss how the study of infrastructure includes such actors; they play a significant role but are treated as negligible.

Active Users and Participatory Infrastructure

From the previous discussion, we know that infrastructural systems are designed and maintained to be stable. In other words, they are not stable by their nature. Although unprofessional engineers cannot get inside a well-designed technological system and even well qualified engineers may solve only a small part of the puzzle, these small changes matter to the system in a broader sense. When studying how a large technical system evolves, Hughes (1987) argues “if a component [was] removed from a system or if its characteristics change, the other artifacts in the system [will] alter characteristics accordingly” (ibid., p. 51), though this does not necessarily lead to change for the whole system. In fact, most of the time, such small changes may “leave the core of the system intact” and meantime lead to “a recalibration of other parts of the system” to reach consistency and avoid change (Furlong, 2014, p. 463). The contribution of small changes does not end with altering the technological system. Further, since the small changes make its periphery clearer, they increase the awareness and participation of the users. It may be seen as a new round of normalization to the specific part surrounding the small change. Connecting the users with the technological system opens up the possibilities from small changes to further changes. Or, in other words, the system may possibly experience continuous change and evolution. In the words of Furlong, it is “system maturation” (ibid.).

Perhaps due to the lack of awareness of the small changes and infrastructural instability, few of those writing traditional Large Technical System studies have explored the users’ involvement. These writers tend to work from a macro perspective, through which only political and economic structures play a dominant role in shaping the infrastructure system. To understand the importance of users in a socio-technological system such as an infrastructure is not simply to adopt an “interactive view” by arguing that the social and the technical mutually shape each other. The radical “seamless web view” offered by Actor-Network-Theory argues that rather than a pre-given stable differentiation between the social and the technical, such differentiation “should be seen as an accomplishment” (Bijker and Law, 1992b, p. 201). Therefore, the first methodological approach provided by this view to investigate the actors is to focus on delineating the boundary through the

process of forming and breaking up; second, it offers a user's heuristic view, starting from which users are no longer passively dominated by the technological system, but are actively making small changes to the entire system. Together, these issues may be developed as the study of "infrastructure as mediator" which emphasises how "users" and "user relevant elements" are included in the techno-social system. As a mediator rather than an intermediary, the infrastructure adopts contradictory aspects, not only the character of infrastructure as subjection, and control "becomes slippery and difficult to locate" (Edward, 2003, p. 204). The infrastructure itself becomes the synonym for platforms to compete from, arenas of resistance, or channels to negotiate.

From the classic study of the Social Construction of Technology (SCOT) we can see that different interpretations by social groups "involve the content of the artifact itself" (Pinch and Bijker, 1987b, p. 42). How a certain problem is interpreted by social groups has already been taken into consideration. It will then have effects on the "flexibility" in the design of artefacts (ibid., p. 40). This argument is also applicable to the user configuration of machine design. Although it is inevitably avoided, in order to prevent some "unexpected and uninvited uses for the machine" (Woolgar, 1991, p. 89), much effort is put into machine design that focuses on boundary work, with the purpose of guiding and educating users to develop a certain relationship to the machine. Studies like this show that the users' action is already involved in the design of technological objects in the form of a "script" or a "scenario" (Akrich, 1992, p. 208), suggesting that "the vision of (or prediction about) the world" is already inscribed in the "technical content of the new object" (ibid.).

It is clear that the way that individual users interpret and construct meanings around a technology may not be separately considered as something outside the socio-technological relationship. In the next step, it is discovered that the users' behaviour not only influences the design of socio-technological artefacts. The original design is sometimes, challenged by unintended use and users then become "active agents of technological change" (Edward, 2003, p. 202). For example, Fischer's (1992) study of the telephone reveals that, besides the intended outcome of telephones to expand information and communication connections, the users of telephones appropriate the technology to enhance the sociable purposes of existing communities. Fischer's research provides a "user heuristic" approach, which emphasises the significance conveyed by "the users rather than the imperative properties of the technology" (ibid., p. 19). He concludes that

the individual users and communities are not passively receiving what the technology and its producers deliver. Rather, space has been allocated for the users to choose and actively join the process of technology construction, and not only obey what the instruction book says.

Therefore, by means of technologies, users are actively and purposefully registered to the technical system and participate in the operating process (Oudshoorn and Pinch, 2003). Consequently, it undermines the commonly portrayed role of technological systems as things that are simply dominant, or governed by their own imperatives. At the same time, the waves of small changes sent out by users and received by the system reduce the predictability of and control over the system. Any discussion related to the system should be based on specific study of particular groups of users within particular contexts, not only “on unverified a priori assumptions on the potential risks and threats” (Coutard and Guy, 2007, p. 728). Methodologically, the empirical and historical study of the adoption of different technological systems by different individuals or communities and the derivation of the meaning of technical appliances from the interaction process, should receive more attention.

As large technical systems bridge massive geographical distances, the study of “active users” reminds those who study infrastructure to pay attention to the possibilities beyond the imagination of its designers and the existing embedded context. It is “[d]esigned by collective system builders and shaped by participatory users” (Hughes and Coutard, 1996, p. 47). Since the infrastructure is “taken up and used in everyday life” by various users, the infrastructures “spin off in wholly unexpected directions, generating intended and unintended outcomes” (Larkin, 2008, p. 4). The infrastructure contingency may then be explained by the concept of the mediator, which is “not fully controlled by producers” and meanwhile “creates more favourable conditions for users” (Oudshoorn and Pinch, 2003, p. 23). Therefore, research from an infrastructural perspective will contain not only an account of the way in which domination and discrimination are structurally constructed, but also how infrastructure is adapted within specific environments. Moreover, beyond centralized infrastructural systems, the customised and differential infrastructural supply of services then becomes a more important channel for easing competition and resistance than relatively ambivalent and contingent social effects can be.

Empirical studies of infrastructure show that even in extreme cases when infrastructure services fail, the participation of alternative individual users is sometimes able to shake

infrastructural domination and the social control behind it. Larkin (2008) notes that instead of being linked to the smooth network of an electric grid, devices in Nigeria always depend on small private household generators. Every time the electricity supply from the power grid disappears, people must start up a private generator that is already prepared and ready for use. It is not a simple issue of switching the electricity provider. Starting a household's private generator turns the use of electricity into a conscious behaviour, which reminds individuals that electricity is something they have to make, to produce. This experience of making electricity not only "highlights the link between technologies and political order" (ibid., p. 244) which reminds the users "the collapse of the integrated infrastructural idea and the reconfiguration of the state's ambition to provide developmental progress" (ibid), but also reveals the potential of political participation through infrastructure, even when the situation stems originally from infrastructural disconnection. As Larkin concludes, in "the disaggregation from networked electricity to autonomous generators lies the shift in Nigerian society from the developmental state to new forms of individual, competitive, liberalism" (ibid.). It then "becomes the justification for throwing one's hands up at the promises of nationalist elites and turning instead to religious and other networks that might prove more reliable" (ibid., pp. 246–247).

As a socio-technical system, what are linked to the infrastructure are always individuals, especially when it is discovered that, thanks to technological development, the infrastructural service can be more and more privatized and customer-oriented (see Section 2.3). The active user and participation through infrastructure provide grounds for further discussion on the location of the political. As discussed in this section, infrastructure is not merely an instrument and tool of political expression, but also infrastructure "itself becomes a political terrain for the negotiation of moral-political questions" (von Schnitzler, 2013, p. 671). The participation of individual users and the blurred boundary between the human and non-human actors allows us to bring the discussion to the question where to locate the political on private and material platforms. The new location of the "political" not only seems possible, but also has advantages in a material, embodied, or even affective sense, in highly contextual situations or in cases with distinctive features.

In this section, the discussion started from the legacy problem of what makes the "self-barrier" infrastructure space, a space where older infrastructure becomes a barrier to later

rounds of capitalist accumulation (see Section 2.3). It is first argued that the materiality of infrastructure creates the space for infrastructure by congealing time-space. On the one hand it facilitates the capitalist desire to produce a space-less world and on the other it also serves as a terrain for hundreds of congealed actors to meet, negotiate and compete. Such an idea leads to the further argument that infrastructure is an ever-expanding heterogeneous system, within which both human and non-human actors play important formative roles. It emphasises that there are no pre-determined causes for the relationships between the actors concerned and the forming of the system. It is also where the contingent nature of the infrastructural system originates. Since the stable infrastructure is understood as a phased outcome, it needs a constant maintenance and balancing of power to keep its stability, otherwise its dominant role is gradually altered by small changes intentionally and unintentionally initiated by users.

The discussion of users' participation then refers back to the "self-barrier" infrastructure, where the discussion in the section started off. As a bridging concept between sections 2.3 and 2.4, it allows the discussion of infrastructure to acquire both a spatial and a technological scope. Learning from critical urban theories, with the typological spatial pattern provided by various infrastructure connections, concepts such as "time-space compression" and "power geometries" inject discussion on global political economy into the infrastructure. At the same time, from the study of science and technology concepts such as "assemblage agency" and "actor-network theory" inject agency and contingency into the socio-technological assemblage. In this way, infrastructure provides a different approach to studying the local-global, rural-urban, now-before, social-technical, unlike the views of binary dichotomy.

2.5. Summary

This chapter reviews the theoretical and empirical studies of infrastructure, aiming at understanding infrastructure as the mediator of the co-evolution of technology and society. It provides a co-construction approach at the beginning of the chapter (see Section 2.2) which argues that the technological innovations and immaterial orders are not external either to each other, or to the environment within which the social and technical aspects are formed. From this perspective, the infrastructure is then defined as a series of social-technical systems, consisting not only of physical technological objects, but also social orders, legal debates and policies for regulation, etc. With all the relevant social and

technological factors coordinated, the construction of infrastructure is also the normalisation process of infrastructure. Since the infrastructure is some unnatural thing that we naturalise in our everyday lives, what is needed is a historical investigation of the way that the infrastructure is normalized. Besides, social and cultural perspectives on the way in which the social forces compete and how the symbolic meanings are embodied are needed to lead the discussion beyond pure historical description.

Critical urban theory contributes to the study of infrastructure from a political economy perspective (see Section 2.3). It frames the infrastructure as a physical articulation of the uneven distribution of power in society. It is not opposed to the co-constructive approach, though the significance of political and economic forces receives much attention. From this perspective, the capitalist desire for a space-less world is viewed as the main motivation for expanding infrastructure and the vast connections and networks built by infrastructure nourish the capitalist logic of space production. Thus a political view of infrastructure can be taken, which argues that there is a power dynamic between privileged and subordinated groups. Instead of treating infrastructure as a neutral and ethics-free technical object, researcher should pay more attention to the uneven and fragmented infrastructure networks and also to the embedded power dynamic.

There is one important issue, the “self-barrier” infrastructure space, raised by critical urban theories. This points out the contradictory nature of infrastructure, emphasising the mobility of things by producing fixed and confining structures. In other words, while the mobility of matter is supported by the infrastructure, the fixity and materiality of infrastructure should not be ignored. This is exactly how the discussion started of infrastructure as a terrain for congealed actors to meet and compete (see Section 2.4). It is argued that as an ever-expanding heterogeneous system, both the human and non-human actors are important in forming the assemblage of the infrastructural system. Instead of having a pre-determined causal relationship, the contingent nature of infrastructure requires constant maintenance to keep it stable and dominant, otherwise the small changes initiated by users will take effect and gradually alter the system in their direction.

The first part of the empirical study (Chapter 4) contextualizes the story of constructing the electricity infrastructure as part of the urbanization process of the touristic town Huangyao in southwest China. The chapter describes how the electricity infrastructure construction has become a never ending negotiation, which recalls that it is problematic

to treat infrastructure construction as a purely technological issue. In other words, besides the technological issues, there are other issues which make infrastructure construction a problem worth discussing, such as the inseparable and discursively located social forces. The political economy approach of infrastructural studies is adopted to reveal the power dynamic accompanying the urban transformation of the rural area.

Following Chapter 4 which argues that the infrastructure construction in the town has become a significant problem, Chapter 5 shows why the problem of electricity infrastructure may never be solved. By taking a social construction of technology (SCOT) approach, it focuses on the normalisation and closure process of electricity in the context of Guangxi and rural China. The discussion involves a historical investigation of the electricity system, so as to reveal the relevant social factors and institutional dynamics which have led to the failure of the electricity infrastructure construction. It argues that the power industry reform detached electricity use from the other social institutions of the local community. Together with the upscaling effect of the state-led tourism project within the urbanisation process, it produced a non-communicable situation for all actors involved.

The last empirical chapter examines the current competition for electricity by observing the users' participation when the electricity supply is cut (off). It takes the actor-network approach and treats the electricity infrastructure as a heterogeneous system. The fixity and materiality of infrastructure play significant roles by congealing both the human and non-human actors within the ever expanding system. Discussing on the micro scale, I focus not on the normalisation process, but mainly on explaining how the infrastructural contingency originated from the constant competition and maintenance.

The theoretical approaches provided make clear what specific questions are asked and from what perspectives the infrastructure is examined in each empirical chapter. However, before we start the empirical discussions of cases, the methodology chapter, which comes next, describes the specific methods used for data collection and analysis, together with the supportive theory on which they rest.

Chapter 3 Methodology

3.1. Introduction

Even before I first arrived in Huangyao, I had heard of the erratic electricity supply from tourists' comments on social media. At the time, I did not pay much attention to it, supposing it just a simple technical problem. I arrived in Huangyao Ancient Town in June 2015 to start the first period of fieldwork. Since the Ancient Town is located in the core area of the tourism project, it is busy all day long. Almost everyone who is doing tourism-related business comes to the Ancient Town, or simply lives there. For my fieldwork research, such dense and centralised data distribution was very convenient. I could come across a huge amount of data almost without leaving the Ancient Town centre. This immersive experience and intensive observation has made me realize the decisive role of infrastructure.

When the infrastructure functions properly, people work and live normally. It feels as though the infrastructure does not even exist, or it becomes imperceptible. But once a problem with the infrastructure arises, discussions follow about ways to deal with this situation. Especially when the most commonly used infrastructure systems fail, for electricity or tap water, for instance, daily life, public activities, and all kinds of businesses are disrupted. Over time, in Huangyao, infrastructure has become an indispensable topic when people to say hello or gossip together. As a researcher, I gradually realized that the changes brought about by the collapse of infrastructure are not limited to the temporary troubles that they cause, but gradually perceived as commonplace. What impact on people's lives does it have when unstable infrastructure is normalized? Asking this question reveals the part that infrastructure plays in life. Therefore, I decided to observe infrastructure "in action". In this chapter, I discuss how to navigate the social and political environment by looking at it through infrastructure.

Following the theoretical discussion in Chapter 2, with the help of Actor-Network-Theory (ANT), Section 3.2 discusses how to understand "active infrastructure" for

methodological purposes. Infrastructure is at the centre of this research. It is approached by the technique of “life-history interviewing”, a sub category of the narrative interview, which was originally used to let interviewees tell the story of their past. Section 3.3 deals with the specific aspects of choosing the research field and reflections on doing ethnographic work in this field. Huangyao, as the main research site, will be described and defined. In Section 3.4, I introduce in detail the specific methods used to collect data during four fieldwork trips. Finally, Section 3.5 provides a summary and a list of the relevant actors.

3.2. Active Infrastructure as a Method

Following the co-construction approach which has been argued in the theory chapter (see Section 2.2), materiality and sociality, although they sound like two different themes, “produce themselves together” (Law and Mol, 1995, p. 274). In the context of infrastructure studies, this emphasises that the social and the technological are not two sides of a great divide. Combining the discussion from both sides, “may not ‘add up’ to form an overall pattern or structure” (ibid.). The social and the technical are always contained within each other. For example, it is undeniable that, in the case chosen by this study, the electrification of the town is inseparable from various relevant local and non-local social and political actions and processes. This idea raises a question about the methodology adopted by this study: how to discuss the situation as a whole, without assuming that the whole as merely the sum of the “social shaping of technology” or the “technological shaping of the social”. As discussed in the theory chapter, where infrastructure is viewed as heterogeneous networks, I want to start the methodological discussion from the redefinition of the social in Latour’s work:

“It is that society itself has to be rethought top to bottom once we add the facts and artefacts that make up large sections of our societal ties... What appears in the place of the two ghosts – society and technology – is ... a *sui generis* object: the collective thing, the trajectory of the front line between programs and anti-programs” (Latour, 1992, p. 254).

Latour points out that there are two different kinds of social, one big and one small. As he sees it, small social is “some glue that could fix everything including what the other glues cannot fix”, whereas big social refers to the whole “glued together by many other connectors” (Latour, 2005, p. 5). From this differentiation, it can be seen that the study

of social has shifted from the “residual aspects of” (ibid., p. 4) many other subjects to what is explained by many other subjects. Therefore, the definition of the social, and also the aim of sociology, becomes much wider. Following this understanding, the original nature of sociology should be emphasized as a study of living together, and a study of the ways in which the so-called community or society is held together. The social is not defined as “a special domain, a special realm, or a particular sort of thing, but only as a very peculiar movement of re-association and reassembling” (ibid., p. 7).

“What society is made of” is a question that underlies the reassembling approach. If there is a pre-existing society external to the individual and waiting to be delineated and understood, then the knowledge of society can be viewed as the order of nature. Whatever the departure is in the end, the final picture will be no different. This approach justifies sociology as another independent discipline, for “all the paths will merge in the end since they are simply somewhat arbitrary ways to delineate the same big animal” (Latour, 2005, p. 36). However, as a modification of the idea just proposed, Latour says “neither society nor the social exists in the first place” (ibid.). Instead, they exist in process. For an ANT approach, there is no pre-existing society or social, and therefore, different choices of departure point can lead to totally different pictures. “For the first school, society is always there putting its full weight behind whatever vehicle can carry it; in the second approach, social links have to be traced by the circulation of different vehicles which cannot be substituted by one another” (ibid.). In other words, choosing the point of departure is critical for the ANT approach, since it inseparably contributes to the result.

Next in this section, I first describe what role the Actor-Network-Theory plays in defining the present research method and research objects. It aims at justifying the choice to put infrastructure in the centre of this study. Then I discuss what research method to approach electricity infrastructure is best to adopt in the context of electricity shortage.

Actor-Network-Theory as Method

The purpose of this study is to track the process of the upgrade of the electricity infrastructure within the old town centre of Huangyao, carried out in the context of urbanisation and tourism development. Through this process, we see how local/nonlocal, private/public, dominance/resistance are produced and affirmed. As noted at the beginning of this chapter, I want to avoid limiting the discussion only to revealing the relevant social forces “behind” the process of the infrastructure upgrade and the planning

of urbanisation. The urbanisation and infrastructure upgrade should not be viewed as dead matters resulting from the impact of social forces. Instead, the flows and connections of the existing electricity infrastructure as well as the rapidly expanding tourism development not only passively underwrote the social processes, but were also actively involved in “assembling these very social and political forces that seem to have preceded it” (Shamir, 2013, p. 9). Actor-Network-Theory (ANT) is in harmony with the research aim, since it provides a method for tracing the connections without predefining the causal relationships among the actors. Instead of telling people the causal relationship between things, what ANT can show is how things are assembled. Therefore, by adopting ANT as a method, this research does not merely focus on providing a direct answer to questions such as what causes and shapes urbanisation, tourism development, and the electricity upgrade process of Huangyao Ancient Town. It also provides concrete details of the way in which the negotiations take shape.

Tracing the process, most of the time, means letting the “object” act. This is why ANT is generally considered a method by which non-human actors get more credit. It is a way of describing how things or matters tentatively come together, and contingently make changes happen. However, the question arises, how do objects acquire the ability to make change? And why does it matter to pay attention to the non-human actors functioning in the networks? It is actually a question of whether nonhuman actors are immutable connectors of some kind, or something changeable, depending how they are connected to others (Carroll, 2012; Shamir, 2013). Latour’s answer to this question is to distinguish the concept of intermediary from of mediator. An intermediary “transports meaning or force without transformation” (Latour, 2005, p. 39). There is no difference between the inputs and outputs that pass through the intermediary. “No matter how complicated an intermediary is, it may ... count for just one – or even for nothing at all because it can be easily forgotten” (ibid.). Unlike an intermediary, a mediator functions in a complex and unpredictable way. “No matter how apparently simple a mediator may look, it may become complex; it may lead in multiple directions which will modify all the contradictory accounts attributed to its role” (ibid.). It is hard to set up boundaries for mediators and to control their interconnectedness. Therefore, “their input is never a good predictor of their output; their specificity has to be taken into account every time” (ibid.). This is in accordance with what was discussed in Section 2.4, that origins can be traced backwards only, since mediators transform and modify things and themselves.

Of course, the project of the Huangyao tourism industry and the urbanisation, along with the tourism development in Huangyao Ancient town. could not have taken place without the intervention of social forces. Supported by different levels of local government, including county level government at the beginning and prefectural level government since 2015, financed by state owned or privately owned developers, tourism in Huangyao is understood as a platform upon which land speculation was taking place in the name of tourism development. Although I do not deny the important role that the economic and political context plays shaping the everyday life of Huangyao, this study doubts whether the local residents and the residential infrastructure which closely relate to local life were just intermediaries for transporting the top-down might of the government-developers model. This research hypothesizes that the infrastructure system works as a mediator, which not only transports meaning but at the same time actively contributes to the system it connects with. Such a hypothesis is empirically examined below, and the result shows how far infrastructure contributes to the changing of situations.

Besides “actor”, which refers to both human and non-human actors, “network” also should be defined when ANT is adopted as a method of research. In the context of this research, the electrical grid can be seen as a network composed of both a set of technical devices, circulating electric current according to a certain electromotive force running through conductors with certain levels of resistance, as well as a variety of human and human-related actors, including individual users, engineers, companies, regulation departments, etc. Actors are interrelated with each other and form a complex network. This network which consists of actors seems to be a perfect case for adopting ANT. However, how can we distinguish the network in ANT from other networks? It seems that all kinds of networks, such as social networks and technical networks, share similar characteristics. In other words, why does this research on infrastructure adopt ANT rather than other network approaches? Shamir (2013) provides the answer by saying “the actor network must be constantly operating” (ibid., p. 12). It can adopt a physical form for even a relatively long time. But only when it is in action will its special character as an actor-network appear. Unlike the technical networks which are objectively designed with a stable function and structure³³, the “actor networks can only reveal themselves when

³³ In this thesis, electricity infrastructure has a stable function and structure, but, at the same time, it is something constantly operating. Especially when extra eclectic devices boost the supply (see Chapter 6), the “unpredictable action” happens.

activated” (Buzelin, 2005, p. 197)³⁴. Often, it is empowered by “unpredictable actions”, and “ceases to be once this essentially messy and heterogeneous work stops” (ibid.). Therefore, the actor-network has overlaps with other kinds of networks, including social networks and technical networks, as long as the actors is able to “induce” an action (ibid.).

Besides giving infrastructure more credit, it inspires researchers with the idea of considering infrastructure as a social-technical assembly leading and of making a description of the whole. Latour distinguishes “the network that is drawn by the description” from “the network that is used to make the description” (Latour, 2005, p. 142). The actor-network is here the method for drawing a description. In this thesis, the electricity infrastructure becomes the centre of the method, not because it is able to represent or translate a certain kind of network, but a network is formed through the process of tracing actors’ connections and movements. The infrastructure network is understood as socio-technical assembly, not only because social and technical elements compose it, but most importantly, because it allows and leads to a formation in and of itself by action. In this thesis, as it traces the infrastructure actors, there will form a network, a socio-technical assembly, consisting of the social and technical formation in the context of Huangyao’s urbanisation through tourism development.

Guided by the methodological principle of ANT, in the context of infrastructure study, I do not assume that there are pre-existing actors shaping the infrastructure. Instead, I want to trace the relevant actors and the group formation through this process in action. By tracing the electricity infrastructure upgrade, it is gradually discovered that the seemingly technical activities were not only shaped by, but also actively contributed to the formation of public/private, local/nonlocal fissures. In addition, by tracing the process of the electricity infrastructure upgrade in the context of urbanisation and tourism development, I want also to test whether group segregation formed through everyday electrical activities and whether this segregation is different from “an episteme of separation” (Shamir, 2013, p. 21) – the conviction that different groups are fundamentally opposed and must be separated to different political and geographical conditions. As these categories may apply to some cases, it is also worth examining in what circumstances the separation can or cannot be altered.

³⁴ Originally cited by Shamir, 2013.

The ANT approach analysis of electricity infrastructure upgrading pays particular attention to the phase when it was about to break down and the upgrading and expansion started. It would be useful to adopt it both for understanding the substantive aspect of the electricity situation in Huangyao, and more specifically how social and political forces constantly engaged with this situation before and after. I would not deny that working in the social context, tensions arose among developers, local residents, local governments, and individual business owners before the electricity blackouts and upgrading. However, the point of adopting ANT as method is that the coalescence and segregation among groups have constantly to be negotiated and maintained. From this perspective, there is the question of whether the electricity upgrade, in the context of urbanisation and tourism development, triggers or deepens a local/non-local and public/private divide between local residents, business owners, government officers, and other developers. It may also be worth looking at this situation via different epistemic methods, such as from the point of view of the engineers or the long term urban-rural migrants. And if we do not equip ourselves with the idea that the local community was deprived within the process of urbanisation and the tourism industry which were dominated by the political support of the local government and the financial backing of developers, then, in a broader sense, what is the competition for electricity resisting?

To summarise this methodological approach, instead of using the group difference of local/non-local and the clear separation between public/private sectors, this study examines how the differences are negotiated and maintained, entangled with the material process of planning/contesting/upgrading electricity cables during the urbanisation of Huangyao in the context of tourism development. Roles were switched (Shamir, 2013) between laying out the electricity wire and the formation of groups. The electricity wire and its everyday performance then became the independent variable. Hence, the forming of groups became the dependent variable. In the following paragraphs, I discuss the specific method adopted to investigate the electricity infrastructure during the process of upgrade and contest.

Life History Interview with Infrastructure

After determining the infrastructure as the central research object, we shift the discussion to ask how infrastructure might be approached and what specific aspects should be considered. In this research, life-history interviews are the main method of approaching

the electricity infrastructure, as if the infrastructure were a person who was able to share his own story; or other people who have had encounters with the infrastructure will share their story about it with the researcher. Life-history interviews first came from the Chicago School sociologists of the 1920s (Langness and Gelya, 1981). A life history documents all the key contours of a person's life, with the aim of understanding cultural or historical themes. In later studies, life history has included forms that focus on disjuncture as a motif for "identity work", creating autobiographical accounts from compelling personal issues and crises, and a mix of genres (Heyl, 2001; Plummer, 2001). As a method of accessing the electricity infrastructure, life-histories are of great importance in terms of having dialogues with the past, as well as taking subjective data into consideration.

In traditional life-history interviews where the interviewees are human beings, interviewers ask them to describe their lives and give a living picture of how their present lives are linked to the lives that have preceded them. The purpose of such interviews is to describe what it is like to be this particular person (Lindlof and Taylor, 2011). By holding life-history interviews, researchers can effectively ascertain the interviewees' attitude and worldview through the medium of storytelling. In addition, life-history interviews are particularly able to gather information about things or processes that cannot be observed by the interviewer at the time of sharing the interview. The infrastructure systems and the tremendously huge networks that they form are not built up overnight. Researching such a system, even on a small scale, is unavoidable for anyone who looks into the history of a target infrastructure in a particular area. Therefore, the study will start from the top layer of evidence that could be seen at the time I entered the field, and will then trace as far back through history as is needed. It is just like the results of a life-history interview with someone that shows the trajectory of the life. This time, however, the interviewee is not a specific person, but the electricity infrastructure. The previous stories of infrastructure are critical in understanding the evolution of infrastructure and views about it. The process of data collection always means recovering a mess obscured by quantities of raw data. Relevant resources include urban planning details, archives of meetings, previous newspapers and yearbooks, as well as electricity codes and standards, etc. (for specific data collection methods and resources see Section 3.4).

Life-history interviewing, in the sub category of narrative interviews, is equally not only a method for "capturing" stories; it also assumes that people understand who they are

partly through their everyday performance of narrative (Lindlof and Taylor, 2011). This means that in their research, researchers must weigh whether the act of storytelling has the same importance as the story content in the interviewee's narrative. Unlike other types of interview, which for analytical purposes pick out certain kinds of material from the story, such as themes, times, places, or opinions, narrative interviews are concerned with the entire story. As Chase points out:

“[U]nlike a chronology, which also reports events over time, a narrative communicates the narrator's point of view, including why the narrative is worth telling in the first place. Thus, in addition to describing what happened, narratives also express emotions, thoughts, and interpretations” (Chase, 2008, pp. 64–65).

Thus, life-history interviews with infrastructure also include various narratives provided by both human and non-human actors. For example, in my fieldwork experience, I saw the possible research sources as, first, the influential actors of the infrastructure system, such as planners, designers, and users, etc. Besides capturing their routine work with infrastructure, I judged it important to think about the way in which this work is perceived. The second important resource was the differences between different actors. Since the urban-to-rural migrants were heavy users of the electricity system, they could not get used its being unstable. From their perspective, an electricity upgrade was imperative. In contrast, the local residents had lived with low-quality electricity for a long time. They still cannot understand the strong desire among business owners for high quality electricity. In their opinion, the breakdown of the old electricity system originated from the development of the tourism industry, which has little to do with the improvement of their lives.

This varying perception of infrastructure among the different groups informed their judgments and actions about the infrastructural (electricity, information, water, etc.) situation. Therefore, the third and the most important perspective is related to the interaction between the human actors and the infrastructure system. What action do users take when the electricity system fails to satisfy their expectations? How do they justify their action? Does it make any change to the infrastructure? Such small actions include, for example, the repair or the unintentional use of the infrastructure system. Rather than focusing on material infrastructure networks, “repair” operates as a kind of interactional maintenance of order in everyday encounters and conversations. It is one of the most powerful means of revealing the politics of maintaining the normal circulation within an

infrastructure, by studying the timing and location of stasis and disruption to the flow. It presents the frontier and the process of negotiation whereby the infrastructure evolves and grows up.

Supported by the Actor-Network-Theory, in this section, I first justify how important it is to put infrastructure at the centre of this research and then discuss how life-history interview can work as an effective method of approaching infrastructure. Some specific perspectives are introduced as “interview questions”. In the next section, I first, briefly introduce the field site where the electricity infrastructure was upgraded; and then justify how this touristic town works as an appropriate research site for the present study.

3.3. Field Sites in Huangyao Touristic Town

In order to carry out an intensive study of people’s lives in a community, I confine my research within a reasonable geographical scope, ranging from village to town size. The first reason to choose the small social unit of a village is a practical one. The community and people under investigation needed to be within easy access of the researcher, in order to observe and participate personally and intimately. However, the unit should not be too small, otherwise it does not provide a wide enough cross-section of social life. These are the two reasons that I chose a “town village”, a village-sized area which stood at the centre of a town and functioned as its centre, as the proper site for the fieldwork. Below, I first justify how I thought the research purpose would be achieved by choosing a specific research site. Then the discussion moves to a general introduction of the significance of choosing Huangyao tourist town as the research site. Finally, some methodological reflections in relation to the specific qualities of the research site are presented, leading to a further discussion of the research methods and data collection in.

Delimitation of the Field: Range and Site

Two famous social anthropology works of peasant life in China: *A Field Study of Country Life in the Yantze Valley* (Fei, 1939), and *Yunnan San Cun* (Fei and Zhang, 1990), suggest that many researchers have chosen a “village” as a basic research unit in studies on Chinese society.

“A village is a community characterized by its being an aggregate of households in a compact residential area, separated from other similar units by a considerable

distance ... organized in various social activities as a group ... It is a de facto social unit recognized by the people themselves” (Fei, 1939, p. 8).

As a coherent and consistent system within itself, a unit such as this offers many aspects of social relationships that can be investigated, such as the distribution of authority, economic organization, religious affiliations, and other social ties, and the chance to see how these relationships affect one another and determine the co-operative life of the small community.

However, it does not necessarily mean that all sites named “village” qualify as good research samples. In fact, what makes a village a proper research site comes by and large from its coherent social organization and accessible range. We cannot rule out some special conditions, making some villages unable to stand as suitable research objects. For example, in some parts of China this approach does not hold good because some village households are extremely scattered. Or in some cases, for the administrative convenience, some villages are re-scaled. Sometimes a current village may contain 2-3 natural villages, or the villagers who once lived in one village now belong to a different one. In choosing a research site one must historically distinguish administrative villages from natural villages. The integration and separation of village-level administrative divisions are sometimes helpful for studying changes in village life.

Taking the functioning village as a unit, moreover, does not mean that it is a self-sufficient unit. Close attention needs to be paid to its external links or inter-dependence with other groups. In this research in particular, the starting point is the urban-rural migration which has a built-in connection for linking the local village life to the world beyond. Nor does collecting data from the village necessarily mean limiting the discussion within the scope of the village. This is also an advantage of doing a study using a village unit. From its centre unit, this investigation will radiate to other units such as adjacent villages through economic links, political systems, and social co-operation.

The approach of confining research into one small unit has been challenged by a number of scholars in social anthropology. They doubt whether ethnographic research in a single village or a small unit of a local community can project an image of the greater community. How far can we expand the research result from its small scale to a larger scale? The challenge is basically whether it is possible to use the microcosm to illumine the macrocosm, and to use the particular to illustrate the general. In a country as vast as

China, above all, is the study of a particular micro-community in any way representative of the whole country? Many classic micro-community students have chosen Chinese society, and it is inevitable for them to face such challenges. Edmund Leach commented critically on their work. He argued that the success of Fei's work on peasant life in China was due to the great deal of local knowledge Fei accrued before he began writing. This kind of study concentrates upon "a tiny range of human activity" (Leach, 1982, p. 127), and tells us more about the ordinary social behaviour of mankind. However, since "its core is the very detailed study of the network of relationships operating within a single very small-scale community", Leach reminds us that "such studies do not, or should not, claim to be serve as 'typical' of anything in particular" (ibid).

Fei agreed that to claim one particular village as a "typical" village representing the whole country would be wrong. However, "it is incorrect to deem a rural area as an individual that is totally different from others and it should not be equated with something else - sui generis" (Fei and Zhang, 1990, p. 6). Therefore, the question about whether the study of a particular microcosm could illumine the macrocosm becomes a question about whether the study of a particular microcosm can illumine some aspects the macrocosm. "If we use the comparative method to describe different types of Chinese villages, thus we could approach the aim to understand the whole picture of Chinese rural culture" (ibid.). Since Fei believed that a comparative method of different types leads us to the whole through individual observations, he did research in three types of village in Yunnan, in interior China from 1938 to 1942, based on which he published *Earthbound China: A Study of Rural Economy in Yunnan in 1945*³⁵.

Another perspective provided by Fei to answer Leach's question is asking what is understood as the entirety? What is it that social anthropologists actually do? According to Leach, "what they are trying to do is to arrive at insights which are generally true of all humanity (including the anthropologists themselves) by observing very small-scale examples of human life" (Leach, 1982, p. 122). The "generally true of all humanity" mentioned in this sentence, according to Fei, "isn't an aggregation in math" (Fei, 2002, p. 319). Individuals who are born and live in the human world learnt their behaviour, ways of thinking, and even their emotional perceptions from the environment. The way

³⁵ Co-authored with Yizhi Zhang. The Chinese version was published in 1990.

people learn is basically to imitate the environment and adopt certain knowledge through normalization and education. In other words, the lifestyle of an individual is not external to its own community. “A civilized society can satisfy people’s needs in every aspect, hence it should not be an incomplete one” (ibid.). Therefore, the comprehensive observation of an individual works as a channel, through which the whole of society can be explored. The theoretical reference of Fei’s argument comes from his teacher Bronislaw Malinowski and the belief in functionalism, which is also the basic theory of micro-sociology. They argue that culture functions to meet the needs of individuals. The behaviour and emotion of individuals should not be viewed only as belonging to the individual but as the performance of a series of norms of behaviours and attitudes.

Huangyao Ancient Town: Starting from the Local

The site chosen for this research is a touristic town, named Huangyao Ancient Town. It is located downstream of the Li River, in the north-eastern part of Guangxi Zhuang Autonomous Region in the very south of China. This region is typified by a typical karst lava landscape. The small ancient town lies in the cincture of a chain of dramatic green hills, ranging from 200 to 400 meters high. Since the ancient town is located at the centre of Huangyao Town, people rather call it a “town” than a “village”. In fact, the scale of Huangyao Ancient Town is that of a village, with a total area of 0.688 square kilometres and 2500 permanent residents. The town centre is also known as the “town village”, that is, the Huangyao Street Village in the administrative system, which occupies 3.6 square kilometres. Together with another 18 villages, they form the current Huangyao Town, which occupies 244 square kilometres in total. Further detailed information about this Ancient Town is given in Chapter 4 (see Section 4.2), elaborating on the transformation of this ancient town into a touristic site and the instrumental use of the material and immaterial heritage to promote its value for the culture industry.

Huangyao Ancient Town’s tourism development has both inter-dependence with external links and a coherent and consistent system (see the previous section) within itself; thus it seemed a perfect research unit. On the one hand, Huangyao tourism project was initiated by external forces. As ecotourism and cultural tourism become more and more popular in rural China, the local government has put particular effort into promoting the cultural tourism industry. From the beginning, the large-scale tourism projects needed the permission and support of the governments at county and prefectural level. The fast

growing popularity of this town connects it more and more closely with the world on the other side of the mountains. This makes the case of Huangyao not only representative of the tourism industry, but also, more importantly, an entry point to look into transitional rural China whose development depends heavily on state intervention. It can be seen that, although Huangyao is a town village, the research significance is not limited to its geographical location. Instead, there are conditions of “inter-dependence” and “external links” worthy of investigation.

On the other hand, as a town with its own history and culture for hundreds of years, it also has a coherent social order mediated by, for example, by Street Committees and local kinship networks. The Street Committee, which is an organization of the autonomous villagers of Huangyao street village, should have had the authority of a local community and been able to negotiate between the local community and the local state. However, in the case of tourism development in Huangyao, it experienced challenges from both sides and was unable to play the role of mediator. Other local organizations based on either kinship networks or common business interests did collaborate and negotiate with local authorities and private developers. The connections between the external links and the town’s own coherent order are plainly visible.

Besides the traditional local organizations, urban-rural migrants also played an important role in shaping the social order of the town by investing in small and medium sized tourism-oriented businesses. Before moving to a rural area, these people grew up or were working in cities for many years. Most of them have a limited idea of what rural life is. After arriving in the town, they rent small pieces of land, renovate houses, and set up small business, such as guesthouses, bars, schools, or libraries, or organize music festivals in rural areas. For local residents who have been living in the town for generations, such urban-rural migrants may be viewed as “external links” from some perspectives, especially when the urban-rural migrants’ businesses are based on tourism. However, unlike the “external links” provided by the local government and developers, the connection of the urban-rural migrants to this town shows frequent interaction. They live in the same environment as the local residents, and encounter all the struggles that local residents experience.

With the intensive infrastructure construction directed at rural areas, more channels are provided for political access, economic investment, and population movement, etc. In this era of booming connections when distance is measured by connectedness, time-space

compression reduces the cost of communication over space and at the same time, reinforces the rationality and validity of studies from local sites. In reports of the vast expanding systems of infrastructure, “time-space compression” (Harvey, 1989) is inevitably mentioned, because it emphasizes the significantly reduced distance and increased speed that are now available. However, in discussions of time-space compression, how may we avoid the disjuncture between global and local, urban and rural, “here” and “there”? So long as ‘binary’ exists, distance will never disappear. It is always considered that highways and railways bring rural and urban closer to each other. But how close is close?

Instead of being deflected by the question of whether the explosive growth of connections and networks strengthens a deterioration, this study focuses on the changes brought to the local. This is not to deny the distance, but to jump out of the binary of global and local, to go back to the local, and to start a dialect between global and local. When the global enters the local, even people who have never left the local can learn what is happening at the global level, and bring it into their local life. Similarly, although people are living next door to others in the same place, their world may be substantially different according to the way they are connected to the outside world. This reasoning avoids the mechanistic “container” view of space (see Section 2.3). With this “infrastructural local” view provided, three social factors mentioned above – the local government and developers as project leaders, the local residents who have been living in the town for generations, and the urban-rural migrants who link the urban lifestyle with the rural ones – then have a chance to encounter one another. Instead of treating them as three different social forces, I want to test whether their encounter can be developed as a second local, mediated by infrastructure.

Start with the Familiar: Reflect on the Proposed Research Method

The owner of the Relevant and Relevant Boutique guesthouses provided me with important access to the everyday life of the urban-rural migrants as well as the opportunity to situate myself in the very centre of the development of the tourism industry in Huangyao. But one question about the position and role of the researcher, me myself, in the field, should perhaps be asked in advance. Are the research objects and informants familiar/unfamiliar with the researcher? May the different position from theirs taken by the researcher influence the validity of this research? Research has no preferences for

studying either the familiar or the unfamiliar, but it depends on the research aim, specific research question, and the purpose of data collection. The basic concern behind the question is mainly how a researcher can avoid prejudice raised by a society's previous familiar knowledge. In qualitative research, the subjective matters and detailed information have great impact on the research result. A researcher of social science cannot control the research setting as objectively as if it were a lab. Research strategy needs to make some adjustments according to the specific time and place and the informants who are present. Therefore, the role of the researcher should be clarified before the data collection and analysis. To answer this question, again, the debates between Leach and Fei will be useful.

“Fieldwork in a cultural context of which you already have intimate first-hand experience seems to be much more difficult than fieldwork which is approached from the naïve viewpoint of a total stranger” (Leach, 1982, p. 124). This means that for anthropologists studying their own society vision is inevitably distorted by previous knowledge. What Leach is concerned about here is the preconceptions, such as personal prejudice generated from specific historical and cultural contexts, which affect the work of researchers who study their “own” culture. This is also the reason that Leach chooses to study “others” in his own research. However, it does not mean that studying the unfamiliar guarantees that the research will be correctly attained. As the same scholar writes:

“All the anthropologist's most important insights stem from introspection. The scholarly justification for studying ‘others’ rather than ‘ourselves’ is that, although we first perceive the others as exotic, we end up by recognizing in their ‘peculiarities’ a mirror of our own” (ibid., p. 127).

This means that it is not impossible to study one's own culture by oneself, but it is important to highlight the difficulty of doing so. It is vital for researchers to deal cleverly with the relationship between the research objects and themselves in order to find a good balance between subjective and objective.

I define the fieldwork in Huangyao as half familiar and half unfamiliar. On the one hand, urban-rural migrants, such as the two owners of the Relevant guesthouse, as well as their lifestyle in running a tourism oriented business, belong to the culture that I am familiar with. I have known one of the informants for more than ten years, and the other informant comes from the city where I grew up. One year before I started this doctoral project, I did some research in touristic towns and villages in Yunnan province. In this I interviewed

twenty owners of tourism businesses, through which I learned a little about urban-rural migrants and their general concerns about life in the countryside. Similar experience and “prejudice” has provided me with the convenience of being able to communicate with my informants. I do not think it brings more difficulty than having no contacts in the field. And starting from them, I began to know more local and urban informants through a snowballing sample collection.

On the other hand, studying the urban-rural migrants’ local life, which involved communication with local residents, some of whom spoke only the local dialect, could hardly be called studying the familiar. In this sort of situation, I used the experiences I had from a familiar community to make contact with the unfamiliar. During the research, I could distinguish different attitudes, behaviours, and emotions between the unfamiliar informants and me, as well as the differences between them. I used the comparative method to identify the difference between the familiar and unfamiliar cultures and then explored and tried to understand the unfamiliar. Something worth emphasizing here is that the process of recognizing is not simply taking a familiar frame as a container for the unfamiliar. The familiar frame is used merely for reference when making comparisons with the unfamiliar, and not for defining it. “The reference system only guides you to pay attention to the specialty and characteristic of the unfamiliar” (Fei, 2002, p. 324). Even for Leach, who prefers to study “others” rather than “oneself”, what could not be abandoned was the basic principle that “diversity stems from uniformity, see sameness in differences” (ibid., p. 322)³⁶.

3.4. Data Collection: Encountering Information

After choosing the research site, in this section, I introduce how the research data were collected, including specific approaches to access informants, and also specific methods for getting useful information from informants. From 2015-2018, I made four field trips. The first, to Huangyao Ancient Town, was from June to August, 2015. This is the first time I actually saw and experienced this town, when I got the idea that the electricity infrastructure should be treated as the focal point of the study of Huangyao. Specific

³⁶ This sentence comes from the appendix “Re-read *Preface of Peasant Life in China (Chongdu Jiangcun Jingji Xuyan)*”, of *Peasant Life in China (Jiangchun Jingji)*, published in Chinese in 2002. The original words were written in Chinese “众出于一，异中见同”.

research done in this field trip was mainly based on participant observation, and conversational interviews. The second field trip to Huangyao Ancient Town, was between March and April, 2017. Compared with the first time in Huangyao, my research now had a clearer framework. Therefore, besides keeping participant observation as one method of collecting data, I was also given interviews with critical informants, and got critical information from local government departments. The third field trip was to Beijing, between July and August, 2017. The purpose of this field trip was to search the relevant historical records and studies of electricity reform in China and Guangxi. So I spent most of the time in universities, especially Peking University, which became an important source for my research. The last field trip was to Shanghai, between January and February, 2018. It was very lucky that I got the chance to interview some of the urban planners who had participated in making the master plan for Huangyao Town in 2008, ten years before. They provided important first-hand evidence and ideas not only about Huangyao's master planning, but also some insightful commentary about town and country planning in general, as well as precious experience of ancient town preservation.

Before arriving in Huangyao, I had already made contact with two guesthouse owners. They agreed to host me as a volunteer, which means that I was going to work at their guesthouse (further detail please see the following section) and at the same time collect my research data. As soon as I arrived, through the volunteer work, I quickly acquainted with other business owners and local workers. With these connections which were built up in about two weeks working and living in the town, I then extended my network and built rapport with the local community. After the warm-up stage during the first field trip, I spent another three weeks to conduct 20 one to one interviews and group interviews with the local community. The connection was well maintained and well extended during the second field trip. 5 more interviews were made, including three interviews with people who work for the local state. The last four interviews were conducted with urban planners during the fourth field trip. To summarise, by the end of this research, I had completed 29 interviews with 12 business owners, 9 local residents/workers, 3 public servants, and 4 urban planning experts. Detail information about the schedule and interviewees please see Appendix 1.

The following discussion is developed to show the different research methods used in data collection, but not in the order of the four field trips. Details and reflections are provided along with descriptions of the specific methods.

Participant Observation: Start from the Site

Aiming at accessing the way that “people’s lives are meaningful to them on their own terms” (Machin, 2002, p. 1), the main research method adopted by this study was ethnographic. Data collected in the first field trip in Huangyao were mostly based on participant observation, by simply spending time in a setting with abundant interaction in order to observe what was going on in the field site. As noted above, Huangyao Ancient Town has become an emerging destination for urban-rural migrants and a new centre of the tourism economy. To carry out this fieldwork and to experience the everyday lives of the research subjects alongside them, I chose to work as a volunteer in two guesthouses in this town. The names of the guesthouses (客栈, *Kezhan*)³⁷ are the Relevant (有关, *Youguan*) and the Relevant Boutique (有关精品, *Youguan Jingpin*) Guesthouse³⁸.

The owners of the two guesthouses are Hong and Mao (nicknames), young men from Beijing in their mid-twenties. After graduating from university, they moved away from Beijing, the city where they had grown up, and travelled to south China to start small businesses – running guesthouses in the countryside of Huangyao. They decided to run guesthouses there after travelling around Southern China in the summer of 2014. During the summer of 2015, when I arrived in Huangyao to do the fieldwork, the Relevant had already been open for business for six months. This means that the Relevant was suitable for the collection of data as a fully functioning guesthouse. The other guesthouse, the Relevant Boutique, had finished almost all its preparations and had just started to admit guests. Since the two guesthouses belong to the same owners, working with them was also a good opportunity to compare guesthouses of different styles, and at different stages of doing business.

The Relevant Boutique was the guesthouse that I mainly worked in. My busiest “working hours” were in the morning and early afternoon. As a volunteer in the guesthouse, I

³⁷ In Chinese, *Kezhan* (客栈) is always used for accommodation with traditional decoration and within traditional settings. In this research, I will use “guesthouse” refer to a type of business providing accommodation such as *Kezhan*. This kind of accommodation is commonly seen in touristic Ancient Towns. The size of a guesthouse ranges between 5 and 20 rooms.

³⁸ “Relevant” and “Relevant Boutique” are the original English names of these two guesthouses. The corresponding Chinese names are *Youguan* (有关) and *Youguan Jingpin* (有关精品), which convey the same meaning as the English ones.

worked mainly at the reception, greeting guests, doing check-ins and check-outs, and receiving and accepting bookings online, etc. I would also show the tourists around the guesthouse if they seemed interest in staying. By working like this, I collected a good deal of data that reflected the starting period of a business. At the very early stage of the guesthouse business, the owners, as well as the people they worked with, always had to face unexpected situations. The way these guesthouse owners interacted with guests, their complaints and surprises, provide lively ethnographic data about their ways of understanding life and doing business. For example, in this research, I have seen for myself how guesthouse owners explained the terrible state of the electricity supply to tourists, as well as situations when owners and guests had to bargain. Since the guesthouses are medium-sized, with 10 to 15 rooms on average, most of the time the owners dealt with the guests face-to-face. This kind of personal business style was partly what the owners wanted, which made the guesthouse different from commercial hotels. In my experience, the guesthouse owners would prefer hosting guests from offline channels rather than online platforms, although online platform provides better publicity. This becomes apparent especially when the town experienced bad electricity conditions. Guesthouse owners had to discourage guests from writing negative feedback on online booking platforms and social media platforms.

Late afternoon and evening time were the busiest “chatting time”, since most of the hotel owners and local residents had finished their work by then, and liked to gather at the main foyer of the guesthouse to eat and chat together. During this time, I always had the most informal kinds of ethnographic interview, which are also known as conversational interviews (Patton, 1990) and situational conversations (Schatzman and Strauss, 1973), to collect small fragmented pieces of important data. They occurred while I, as researcher, was busy hanging out with the people whom I was studying. For example, I always stayed and chatted with hotel guests, guesthouse owners, and local residents at dinnertime, listening to their opinions about events in the village and things that had happened in the course of their work. A casual exchange of comments, or a short silence in the conversation, signalled that the moment was right to ask a “research” question and to steer the conversation towards research-relevant topics. An ethnographic interview often occurred in the midst of “other” social actions, while the sights and sounds that triggered the question were still fresh to the participants and me. For example, it is from such everyday chat that I started to be aware that the lack of electricity in the town and the reasons behind it were the most popular topics among almost all the business owners. It

gave me hints and connections to carry out further research about the electricity situation of this small ancient town after I finished the conversation.

The core area of the Ancient Town is over-populated³⁹. In the past, only local residents lived there. At the time, most people were living on agriculture. Before the tourism industry started, some of the houses were almost empty, since many members of local families had gone to nearby cities to work. But now, many houses have been renovated into guesthouses, bars, and shops. Due to the change in the industry that the town lived on, the population and economic scale had greatly increased. Each guesthouse, for example, contained 10 to 15 rooms on average, as the Relevant does. During the peak season, the town's population will be 10 times higher than its normal population. Although the guesthouses keep their traditional outward appearance, the fittings inside the rooms have been modernized with electrical equipment, and there are features such as televisions, air-conditioners and electric radiators. However, at the time when the ancient town's main electricity cabling was constructed, no tourist industry had developed. According to the conversations between guesthouse owners and guests, this is viewed as the direct cause of the electricity failures⁴⁰.

When conversation stopped at the above stage, I always added a question to the conversation by asking "Why not upgrade the old electricity wire?" or opened further discussion by adding a comforting platitude, such as "Upgrading the electric wiring sounds like technically very easy, so maybe such a bad situation will soon come to an end." Then the people who knew better said things like "There is no way out", "The government, local residents, and newly arrived business owners have been planning a new electricity system for years". From their conversation, I started to realize that the electricity infrastructure upgrade had suffered obstacles for a long time. New power lines have been set up on the New Street, but have not yet extended to the Ancient Town centre. It is not a question of the speed of construction: the problems lie at a deeper level. With the continuous enrichment of data gathered by participant observation and conversational interviews, I found that the information provided by dinner-time discussion could be treated as data from casual focus group interviews. Although the scene was not typical of

³⁹ A suitable population for the core area would be 1,700, but it already held 2,500 in 2008 (Guangxi Urban-Rural Planning Design Institute, 2008a, p. 52). For a detailed discussion see Section 5.3.

⁴⁰ For a detailed discussion of the present state of electricity provision of Huangyao see Section 5.2.

the meeting rooms in which focus groups are usually conducted, and there were well organized activities for the participants, and even though the groups had no proper moderator or observer, still, the interaction and different attitudes provided by informants were worth noting.

The data and discussion provided in the empirical chapters are the results of the above methods. They build on insights gathered at the neighbourhood level, including participant observation, conversational interviews, casual focus group (interviews) with business owners, casual labourers, local residents, neighbourhood leaders, and local public servants.

In-depth Interview: Facing with Key Informants

Although formal interviews are important for data collection, I did not conduct informant interviews during the first field trip in Huangyao. I left the interviews till the second and the third field trips, in March to April 2017, and January to February 2018. The first reason for a plan like this was that I wanted to get a relatively comprehensive knowledge of this village without being dominated by other strong first impressions. If I had conducted the informant interviews at the beginning of the fieldwork, it would have more or less influenced my knowledge of the situation in this Ancient Town. Or maybe, it would have stopped me from discovering other sides of Huangyao.

Second, it was good to have a more than one-year gap between the first and second field trips. In this interval, I kept contact with the people that I had met on the first trip. They updated me with information about the electricity struggle and the development of the tourism project. What happened in the year confirmed some of my assumptions, and gave me clues and confidence in collecting more detailed information. For example, the electricity functioned no better than it had done before. Although the leader of the local Town government resigned after a bad electricity crisis when a nation-wide tourism festival was held in Huangyao Ancient Town (see Section 6.4), the electricity problem remained unsolved. Other things were not directly related to the struggle for electricity, though I would not deny that such information was more or less relevant to the condition of the infrastructure, and to the development of tourism in general. For example, although the business of the Relevant and Relevant Boutique guesthouses was in a better state in terms of revenue, the two owners differed about whether they should keep the business in Huangyao indefinitely or move to somewhere else. Moreover, some research on the

economic and social background of this town and the local governmental intervention helped me understand what was happening in Huangyao. I identified some important and possible informants to interview during the second field trip. In the following paragraphs, I first introduce the importance of the interviews and interview data. Then I describe the specific data collection method and interviewees whom I contact during the fieldwork.

Compared with the first field trip, the second and the third had a clearer purpose. In these holding interviews with important informants became the salient method for collecting data. The significance of the interview as a method for data collection may be expressed as

“the tension between treating the accounts of the people being studied as sources of information about themselves and the world in which they live, and treating those accounts as social products whose analysis can tell us something about the socio-cultural process that generated them” (Atkinson and Hammersley, 2007, p. 97).

In other words, there is a tension between the content provided by the interviewee, and the way in which the content originated. What Chase points out is that “the narrator’s story is flexible, variable, and shaped in part by interactions with the audience” (Chase, 2008, p. 65). The audience here, no doubt, means the researcher. The researcher is part of the interview and will have a big influence on the research data. It may be a little confusing to wonder whether the interviewer should be included as part of the research result. Isn’t it, therefore, research about the interviewee and not the interviewer? Behind this is the debate over what can be viewed as interview data and also the debate over the relationship between an interview and the “real”. In other words, whether to treat the interview data as a resource, where the data is seen as reflecting the interviewees’ autonomy outside the interviews; or as topics, which means viewing the data as reflecting a reality jointly constructed by the interviewee and the interviewer.

Can we ever access another person’s subjectivity? Can we make them transparent? Qualitative interviews do not merely study subjectivity, but are the study of inter-subjective phenomena. For example, Rapley (2006) does not reject outright the value of interviews but, rather, urges researchers to conduct and analyse the interviews and interviewees as co-constituted, “interactional”, and observational events. Interview talk, and hence the “interview data” that emerge from the talk, is the product of the local interaction of the speakers. From the constructionist tradition, the talk, or meaning, is locally and collaboratively produced. This means that besides the talk itself, the

interviewee is also viewed as part of the interview. He or she is a specific type of person in relation to this specific topic. As well as the interviewer, his or her ways of leading the questions also influence the interview as a whole. So the talk cannot be analysed independently without taking other elements into consideration. In this sense, interview data may be more a reflection of the social encounter between the interviewer and the interviewee than it is about the actual topic itself. Furthermore, understanding of the interview data comes about not only by focusing on the questions and answers, but also from the biographical, contextual, historical, and institutional elements that are brought to the interviews. From the interviews, researchers should analyse “what actually happened – how your interaction produced that trajectory of talk, how specific versions of reality are co-constructed, how specific identities, discourses and narratives are produced” (ibid.).

This is a very important note for researchers, not only for understanding the theoretical debate behind a specific method, but it is also useful when selecting research samples and conducting interviews. The researcher should focus on facilitating the interviewee’s narrative, not controlling or managing the flow of talk.

“Tellers and listeners must share some ‘deep structure’ about the nature of a ‘life’, for if the rules of life-telling are altogether arbitrary, tellers and listeners will surely be alienated by a failure to grasp what the other is saying or what he [or she] thinks the other is hearing” (Bruner, 1987, p. 21).

A successful narrative interview often requires the interviewer and interviewee to have a close, long-term relationship in order to facilitate mutual understanding and trust. Since narrative interviews are among the least structured of all interviews, researchers need to find the most comfortable grounds for both sharing a person’s story and raising questions naturally. This was also the reason to have conducted narrative interviews during the second field trip but not the first. Although I still do not consider myself as a long-term acquaintance of my interviewees, I do think it was necessary to spend some time to get to know them and the field. It was also a good chance to let the interviewees know me and trust me, before I actually carried out interviews with serious questions.

To fit different research purposes, the different interview methods used in this research, such as narrative interviews, respondent interviews, and informant interviews, were adopted with different interviewees. In the following paragraphs, I briefly introduce how

I approached important informants, and why I sometimes used interview methods that were slightly different.

I used narrative interviews for data collection when I interviewed guesthouse owners on Tianran Street (天然街, Tianranjie)⁴¹. Detailed descriptions of narrative interviews can be found in Section 3.2, above, introducing life-history interviews. One thing I want to emphasise is the method of deriving data from narrative interviews assumes the story tellers to have a clear understanding of who they are and how they are related to the story that they are telling. In this case, both the story told by the interviewees, and their act of storytelling, are worthy of further analysis. During the interview, besides collecting the “facts” of their current life in this touristic town, I tried to encourage interviewees to think reflexively by asking questions on their current life as linked to their past and future. Questions such as “How did you get the idea of running a business in Huangyao? Did you ever expect the lifestyle in Huangyao to be perhaps very different from your previous experience? Do you think this lifestyle will last long into the future? Is there anything you like/dislike about it?” were asked in order to explore how their stories were told, and how they constructed meaning in them. This method was helpful in identifying their different goals and visions of doing business in Huangyao, and also in justifying their different attitudes to the electricity shortfalls. Starting from the owner of the Relevant Boutique, other interviewees on Tianran Street (and some from Yingxiu Street (迎秀街, Yingxiujie)) were chosen for interview by snowball sampling.

For the interviews with civil servants and planners, the informant interview method was adopted, since my main concerns were knowledge and key information. The key point in conducting informant interviews was to identify and contact the most suitable informants. One group of informants was composed of two civil servants (junior officers) who worked on the Huangyao project in the local office of the prefectural level government⁴². Through the data collection process, they acted as guides to the governmental thinking, which I want to analyse. For example, they showed me abundant relevant official documents (unclassified) which define the tourism project, and they also pointed out

⁴¹ Tianran Street is one of nine main streets in Huangyao Ancient Town. It is also where the Relevant and Relevant Boutique guesthouses are located.

⁴² The full name of this office is Guangxi Huangyao Ancient Town Tourism Culture Industry Area Management Committee. I discuss this committee in further detail in Chapters 4 and 5.

which documents had a significant impact on decision-making. To get access to government department, I sought help from a lecturer who had taught me as an undergraduate. This lecturer wrote me a letter of introduction, endorsed by the Journalism and Communication Department of Peking University. The other group of informants were three urban and rural planners. They could speak knowledgeably about the social and technical parts of the Huangyao Tourism Project since they had taken part in making the master plan ten years ago. Planners have to work closely with different government departments, and negotiate with government leaders. During the interview, much precious information was shared, and they also provided their professional interpretation of figures based on the plan they had made. It is one of the limitations of this research that it could come into contact with higher level governmental officials who had made decision about this town. However, the information provided by the planners to some extent makes up for the lack. The planners are working at the Shanghai Tongji Urban Planning & Design Institute Co., Ltd. I contacted them through an introduction made by the Urban China magazine in Shanghai.

Collecting Texts: Encountering the History

Besides the data gathered from ethnography and interviews, during the field trips I consulted historical archives and ongoing historical records. Various documents were collected as textual data, including 1) archives, such as county history, county land property history, history of the national power industry, the Guangxi power industry history; 2) official documents, such as the policies of the Huangyao tourism project, the 11th, 12th, and 13th *Five-Year Plan* at the national level and descending to the level of Autonomous Regions, and Hezhou Prefectural level; 3) mainstream media texts, such as websites, plays, music, and news reports. What useful information was found in these data and where they were accessed are briefly discussed in the following paragraphs.

Archival research, in general, refers to the process of analysing in order the material, including text, figures, and objects, in an archive. By “locating, evaluating, and systematic interpretation and analysis of sources found in archives” (Corti, 2004, p. 20), this research was able to capture the stories of the time the electricity was constructed and the tourism project was launched. What I looked at in the archive was not only descriptive “facts” and “knowledge”, but also prescriptive insight into the way in which meaning was made during a particular period, although when written they were all considered to be “facts”.

Because the purpose of this research is to explore how the infrastructure system and the implementation of the tourism projects impacted on the changing local conditions of Huangyao, rather than historical research on electricity, the archive materials from which I sought help focused particularly on historical records of land property transfers, electricity infrastructure regulations, institutional changes due to power industry reform, development guideline with maps, figures, text, and monographic studies, etc. The archival data verify some of the assumptions that I had based on ethnographic interview data with local residents, such as the reform of rural electricity system. The value of interpretations of such data is presented in Sections 3.2 and 3.5, and the specific analysis is presented in Chapter 5.

Archives in this research are also drawn on, both published and unpublished materials. Published materials were collected from the closed stacks of the Zhaoping County library, and Peking University library, including the general history of *Zhaoping County Annals*, *Land Log of Zhaoping County*, *Hezhou Annals*; *Guangxi Power Industry Log* between 1909-2002 (two volumes, 1909-1989, 1991-2002), *Guangxi's Power Industry history* from 1949 to 2004, *the history of the Chinese Electricity Industry* from 1879 to 1949, *Electric Industry in Contemporary China* from 1949 to 1994, *China Electric Power Industry Policy and Industry Development* from 1949 to 2006. 1036 pictures in total were recorded as data. Unpublished materials were collected from the Construction and Planning Bureau, a department under the Huangyao Ancient Town Tourism Culture Industry Area Management Committee. *Master Plan*, *Detailed Control Plans*, and *the Protection Plan of Huangyao* with planning graphic, figures and monographic investigations. 612 pictures/pages of text in total were recorded as data.

Official documents were collected from the website of different levels of government and related units, such as the 11th – 13th Guidelines of the Five-Year (national) economic plan from the Central Committee to Guangxi Autonomous Region and to Hezhou Municipal Party Committee. Based on these documents, this research explored how the tourism project of Huangyao was defined, and what role Huangyao played in a broader context. By collecting media text, it aimed to analyse what meanings were constructed and delivered to the audience through mainstream media products.

Limitation of Data Collection

Some data that I could not collect form one limitation of this doctoral thesis. I have used other methods to try to make up some of the lack. But some data could only be left for future research. For example, during the second field trip, there was one key informant that I wanted to interview. However, due to some issues that he was involved in, this person was given a long jail sentence. According to what other local residents said, this person was a local resident of Huangyao Ancient Town and the organiser and key player in the “Huangyao Ancient Town Council for the Promotion of Economy and Culture” (黄姚古镇经济文化促进会, Huangyao Guzhen Jingji Wenhua Cujinhui). He was the leader who founded this council to represent the interests of local residents, to negotiate with developers and local governments, as well as to organize protests about the land expropriations. He was also the one who built up part of the sewage system in the neighbourhood of the Ancient Town. It was not because he had participated in local movements that made me keen to interview him. To tell the truth, according to different local residents and individual business owners, his participation in public issues had been questionable. This was the reason that I would have liked to hear his narrative. In the present research his case will be treated as unresolved case. I would like to use this paragraph to record my concern for his situation case at this point, and my hope that there may be a chance in the future to interview him in person.

Language differences also form one of the limitations of data collection which constrain access to the field. Huangyao has a long history of mixed habitation, where languages have been hybridized and many different dialects can be heard. In this region, the main languages are Mandarin, Yangshan dialect (Cantonese based local dialect), and Hakka. However, more languages and dialects than these are spoken in the field. Even within a single family, one of my informants said, “My wife, my daughter, and I speak different languages (dialects), but we can understand each other pretty well.” The complicated language situation requires research questions to be designed and informants to be chosen with caution.

Since Mandarin is my own native language, most of my fieldwork was done with Mandarin speakers. Most of the time, communication in Mandarin went well, since a concern to develop tourism encourages business people to learn to communicate with tourists in most situations. It was not a problem for me to exchange ideas with my

informants. But the language situation in Huangyao also reflects its changing cultural environment and economic focus. Some tourists, and also some business owners do not speak any local dialect since they come from the north of China. However, language problems did constrain the research when gathering information from some local residents, i.e. those whose lives are not much influenced by the tourism industry. Therefore, this research should not be supposed to provide sufficient first-hand observation of attitudes in the very local community. The discussions about the very local community are based either on written materials, such as blogs, letters, and archives; or on interviews with local workers and business owners who can communicate in Mandarin

A further limitation of archival access must be admitted, especially as it concerns the history of the power industry. Although I think it has no negative impact on the current research, I want to record that access to detailed first-hand data that might be captured as a public resource, such as the minutes of the meetings for policy making and implementation. If I were to do historical research on electricity infrastructure, I would want to capture more data should be from national departments such as the National Development and Reform Commission on the macro level, and electric power companies on the micro level. For access to either of the archives mentioned above, I would need to make more contacts and gain permission from both the government and the electric power companies.

3.5. Summary

Following the theoretical framework proposed in Chapter 2, the electrical infrastructure is presented as a socio-technical system. It guides the researcher to adopt a methodological approach which not only examines the socio-technical system by investigating its social and technical aspects separately, and restoring the balance by giving more credits to the side which did not receive enough attention before. Instead, this approach can encourage us to perceive how investigating the infrastructure leads us to explore the transformation of the two sides in a perpetual process.

With Latour's arguments, which redefine social processes as composed of re-association and reassembling, it paints a new picture of society, one which did not exist at first. These arguments impel us to conclude that non-human actors, as well as human being, may play a part in shaping the trajectory of a society. On this basis, the design of the present study takes as mediator the electrical infrastructure in Huangyao, which not only manifests the

politico-economic concerns, but also acts on them and on the whole situation. This is the first analytical insight reached by taking ANT as the main theoretical support. Furthermore, because all the actors may be able to contribute to the final result, no result can be determined before it emerges through the collaboration of its various actors. This is in accordance with what ANT emphasises: that the network is always active, and that it does not exist outside its place of origin. This idea is claimed as the second analytical insight conferred by adopting ANT, which allows a researcher who is preparing the research design to think beyond the existing social structure. Specifically, this research examines how differences between the public and the private and between the local and the non-local are negotiated and maintained in a specific material case: that of planning/contesting/upgrading electricity cables. It gives an account of the electricity wiring system and its everyday performance as an independent variable, together with the formation of social groups and social forces as dependent variables.

It is quite obvious that taking ANT as a main methodological support has allowed the object to be put at the center point, leading the collection of data and the presentation of findings. This changes the tone of the narrative from ‘what do we do with objects?’ to ‘what does the problematic electrical infrastructure tell us?’, or ‘what adjustments have been made to suit the changing nature of objects?’ The present study adopted life-history interviews with infrastructure as a method of investigating the “life trajectory” of a particular socio-technical system. Specific data-collection methods, including participant observation, in-depth interviews, and textual analysis were used to approach different types of data. The actors, including both human and non-human agents, who participated in forming and shaping the life trajectory of the electrical infrastructure in Huangyao are listed in Table 1. The research findings are presented in Chapters 4, 5 and 6, centering on the origin, emergence, and destination of the electrical infrastructure. In Chapter 4, I focus on the problem of infrastructure, showing how it emerged, and how important it is for understanding the politico-economic situation in Huangyao. Then in Chapter 5 I explore the deeper origins of the electrical infrastructure problem, and discuss what makes this infrastructure an unsolvable puzzle. Finally, in Chapter 6 I ask how the problem of infrastructure was pushed to the fore by its problematic functioning in people’s everyday lives, which is also the scene for arguments about sharing the electricity supply.

Based on the above understanding, this research adopted life-history interviews with infrastructure as a method of investigating the “life trajectory” of this socio-technical

system. Specific data-collection methods, including participant observation, in-depth interviews, and textual analysis were used to approach different types of data. With the help of specific research and data-gathering methods, I conclude this methodological chapter with a list of the actors (see **Table 1.**) who participated in forming and shaping the life trajectory of the electricity infrastructure in Huangyao Ancient Town.

Table 1. List of human and non-human actors affecting the electricity infrastructure in Huangyao

<i>Actor</i>	<i>Functions/Responsibilities</i>
Urbanisation and town planning	Land property ownership; land speculation and contestation; and the right of different social groups to participate in tourism project
Ancient Town Legal restriction	Protection plan of the Ancient Town appearance determining that electricity wires may not pass through the main streets
Ancient Town Physical restriction	Narrow streets, dense houses, and the fragile house structure blocking the erection of electricity wires
Administrative forces	Politics among different local state, including Hezhou prefectural city government, Zhaoping county government, and Huangyao town government
Individual users	Different perceptions of electricity use among individual business owners, tourists, and villagers
Large technical systems	The construction of power plants, electrical substations, and long distance transmission wires; ownership and regulation reform of the power industry
Small technical devices	Strategies to boost electricity; concrete engineering work including constant maintenance and repair
Electrical principles	The generating, transmission, and consumption of electricity are simultaneous; The power (P), voltage (U), current (I), and resistance (R) follow basic electrical equations to let electrical devices work properly
...	...

Chapter 4 Infrastructure and Land-based Development

4.1. Introduction

Upon entering the 21st century, China proposed a new type of urbanisation with Chinese characteristics, which raised the rural urbanisation to the level of a national strategy (CPC, 2005)⁴³. Second to the goal of “Beautiful China”, proposed during the 18th CPC National Congress in 2012, one year later, the CPC proposed the goal of “Beautiful Countryside” with “Consultation on the Creation of ‘Beautiful Villages’”, which determined that 1,000 pilot “Beautiful Villages” would be created nationwide. Three years later, emphasising the theme of development, a “Notice on Developing Characteristic Townships” in 2016 proposed to build 1,000 “Characteristic Towns” by the year 2020, a year when a moderately prosperous society in all respects would be fully established, according to the report to the 19th National Congress by Xi Jinping (2017)⁴⁴. Accompanying the national level strategy is vast investment and subsidies for infrastructure construction in the rural areas, as well as the subsequent land conversion from agricultural land to land for construction, as the basis for urban construction. In contrast to the rapid urbanisation of rural areas led by the authorities, the participation of the local community has had little attention and has lagged far behind. This problem has been articulated in the National New Urbanisation Plan (2014 - 2020) as follows: “‘the urbanisation of land’ is faster than

⁴³ See the *Suggestions of the Central Committee of the Communist Party of China on formulating the 11th Five-Year Plan for National Economic and Social Development*, which was discussed at the Fifth Plenary Session of the 16th CPC Central Committee in 2005, and proposed that “building a new socialist countryside is a major historical task in the process of Chinese modernization”.

Data retrieved from <http://cpc.people.com.cn/GB/64162/64168/64569/65414/4429222.html>, 16th September, 2018.

⁴⁴ See the report delivered at the 19th National Congress of the Communist Party of China by Xi Jinping, on 18th October, 2017: *Secure a Decisive Victory in Building a Moderately Prosperous Society in All Respects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era*. Data retrieved from http://www.xinhuanet.com/politics/19cpcnc/2017-10/27/c_1121867529.htm, 16th September, 2018.

the urbanisation of population, and the use of construction land is extensively inefficient” (CPC and State Council, 2014)⁴⁵. The problem pointed out by the National New Urbanisation Plan reveals the importance attached to land itself, meanwhile ignoring the importance of people in relation to land. As a result, it led to a mechanical urbanisation regime even though some of its content, such as the cultural and ecological tourism in Huangyao, is human-centred.

The official data not only reveal that the expanding urban land comes from the rural sector, but also indicates the problem and driving force behind the urban expansion, which is the government’s growing dependence on land revenue. Just as Lin (2009) points out, in order to understand the complex processes of land development, it is critical to investigate “how land is taken away from the rural collective at low cost for high-value urban development” (ibid., p. 284). He notes that, in order to start a project like the Huangyao tourism project accompanied by urbanisation, first of all, a purpose is needed to justify the land conversion. In this process, the infrastructure construction, including the access to transportation, water supply, power supplies (sometimes also to telecommunication, coal gas, drainage, and cable TV), as well as natural land consolidation, (三通一平, San Tong Yi Ping) is considered as a matter of “public interest”⁴⁶ to facilitate the further development of the countryside. In this way, collectively owned rural land is converted to state owned land for construction use, and infrastructure construction objectively facilitates land transfer. “[E]minent domain give[s] governments power to compulsorily take land from individuals as long as this serves public interest” (Ding, 2007, p. 2). In this way, if commercial and industrial projects can be justified in relation to public interest, it is not difficult for them to get access to land. For example, many land projects are developed in the name of geo-parks, eco-tourism clusters, industrial parks, university cities, etc. (Hsing, 2006; Ding, 2007; Hsing, 2010; Chien, 2013; Shin and Zhao, 2018).

⁴⁵ “From 2000 to 2011, the urban built-up area increased by 76.4%, which is much higher than the urban population growth rate of 50.5%; the rural population decreased by 133 million, and the rural residential land increased by 20.45 million mu. In some places, the excessive dependence on the land transfer income and the land mortgage financing to promote urban construction, which intensified the extensive use of land, wasted a large amount of cultivated land resources, threatened national food security and ecological security, and increased financial risk in terms of local government debt.” See Chapter 1 of the National New Urbanisation Plan (2014-2020). Data retrieved from http://www.gov.cn/zhengce/2014-03/16/content_2640075.htm, 16th September, 2018.

⁴⁶ It is also named a matter of “general interest”, or sometimes the “overall situation”.

The power dynamic embedded in the urbanisation process of the countryside is described as “territorial urbanism” (Hsing, 2010; Cartier, 2015; Martinez and Cartier, 2017), within which land has become the most important item of “territorial concrete”. The territoriality of society, which “refers to the dynamics of society’s struggle over place making in a locale” as well as the “struggles over relocation and dislocation” (Hsing, 2010, p. 15) has become the key object to examine, regardless of what the urbanism project is named after. Within the literature of territorial urbanism, I want to connect the research of the tourism project in Huangyao Ancient Town and its accompanying urbanisation process with the broader content of Chinese urban studies. Issues of domination and resistance both loom large here. In this context, to analyse any construction of a tourism project that has urbanisation effects, including the construction of highways and high-speed-railways, must have a dimension that brings in the logic of land-based development, through which the institutional dynamic of the leaders, participants and marginalized groups attached to tourism projects could be examined. The mechanism of local states should be treated as “an ongoing process contingent upon the transformation of the socialist political economy” (Lin, 2009, p. 285), whose social and political origins can be traced to the institutional change in the fiscal system (Wong, 1991; Lin, 2009). Due to the fiscal reform launched in 1994, the local and municipal governments started to develop local fiscal regimes, though they were still “bound to the changing Party ethos and related policies” (Zhao, 2017, p. 60). In order to achieve local fiscal autonomy, besides its income from internal taxes and non-tax income, the local government had to find additional income. Self-dependent financing sometimes also means an entrepreneurial financing. Consequently, rather than being an agent of the central state, the local state, especially if it is a municipal city government, plays an active role (Hsing, 2006, 2010) through the access and regulation of resources such as land and population, and more and more market oriented private capital is absorbed (Wu, 2002; Shin, 2009). The local state, therefore, becomes a set of entrepreneurial agencies regulating the development within the area under their administration and its land, together with the land financed infrastructure (Wang *et al.*, 2011); here, construction becomes a speculative business.

However, from the perspective of the local community, resistance and self-protection are hard to ignore, most of all when the resistance materializes in actions related to land, or other forms of struggle over relocation and dislocation. The story of Huangyao is one of many which have been dominated by capitalization and government interventions during the urbanisation process through the implementation of its tourism project. It is clear that

there has been too little participation from the local community when the actual decisions were made about tourism development. Hence, instead of being passively involved in the implementation process, it is plain that some local residents are apathetic towards the tourism project, or some have chosen to work against it since the forced land acquisition has dispossessed them. This was exactly what the new rural construction movement wanted to avoid in its projects. The Bishan model and Hongcun model (see Chapter 1) remind us that the initiator of the Bishan Project wanted to stay away from the tourism development model, as Hongcun did, to avoid spending vast amounts of external capital and the intervention of various levels of government. The massive development of tourism may change the fabric of the local community and cause people to be marginalized⁴⁷.

In this chapter, the literature of China's urban political-economy is contextualized in the issue of the electricity infrastructure and the dynamic of land-based development in Huangyao, in which the question of how electricity could become an issue in the touristic Huangyao Ancient Town will be clearly contoured. Inspired by previous studies, key factors including agents/institutions and the mechanism to achieve the territorial urbanisation will be specifically investigated in the next two sections.

Section 4.2 focuses on the specific and irreducible historical conditions imprinted on the Huangyao tourism project. By exploring the specific and determinate historical conditions upon which the current discourse of Huangyao's "eco-tourism" has been created by the local state, this section suggests that there are few ways for Huangyao to develop other than by becoming a "gold mine" tourism project, a source of wealth, regulated and exploited by a group of owners. Under the ideological spectacle of urbanism (Shin and Zhao, 2018), the symbolic logic of the massive modern transportation infrastructure becomes one supportive means to justify the territorial urbanisation demanded by the local state. Based on the discussion in section 4.2, section 4.3 focuses on the practice of transforming the Huangyao region into a tourist-oriented town step by step. Based on an analysis of town planning, the mechanism of land finance to achieve urbanisation through a tourism project regulated by the local state is examined. Through

⁴⁷ See the interview between The New York Times (Chinese) and Ou Ning on Dec 15th 2014, headlined *Green Grass can be Perceived Afar but not Nearby: Remember the Bishan Project in Three Years*. Data retrieved from <http://m.cn.nytimes.com/travel/20141215/t15bishan/zh-hant/>, 18th, August, 2016.

land speculation, the boundary between the state and the market is revealed to shift according to the power dynamic between the two.

In contrast to the passionate leaders of the tourism project, the local community seems apathetic and less unified in its everyday interactions. Section 4.4 tells the story of the demonstration against the tourism development model which was directly caused by a confrontation with land dispossession and the failed negotiation on the redistribution of touristic revenue between the local residents, the government, and the developers. It augments the picture of tourism development in Huangyao Town with a story which seems quite opposed to the official line. Being excluded from the official development model, the locals chose either to resist, or to avoid the negative influence brought by the development to their individual lives. As a result, the tourism project which developed on the same piece of land in Huangyao seems to exist in two parallel universes. As the last section of this chapter concludes, the everyday interactions, including the construction of electricity wires, has been informed with distinct political meaning by the territorial urbanisation of the region.

The discussion for this chapter draws on material from official documents concerning the Huangyao project from the local party committees and governments; the planning books and guidance published by the planning institutes; cultural products related to the development of Huangyao and Hezhou city; interviews with planners who oversaw the master plan for Huangyao Town; and interviews with local residents who have either worked in local government or in the local office in charge of managing the tourism project. Moreover, I adopt some secondary resources, including news reports on the construction work in Huangyao and interviews with local CPC leaders extracted from central and local news websites, as well as academic analyses of Huangyao's history and its development for tourists.

4.2. Huangyao: from an Ancient Town to a “Gold Mining” Project

Huangyao has a splendid selection of tourism resources, consisting of unique historical sites surrounded by impressive natural landscape. In this section, I illustrate how the tourism project was implemented in Huangyao's Ancient Town by introducing the idea of a “green economy eradicating poverty”. Its glorious history juxtaposed with its current economic stagnation gives Huangyao a “frozen” appearance, which makes it quite a competitive resource for the tourism economy. Taking advantage of the rising eco-

tourism, the ideological connotations of the Huangyao tourism project are in fact part of the Rise of Green strategy (绿色崛起, Lvse Jueqi) up to the prefectural level of city government. The massive modern transportation infrastructures, as well as the urbanisation of Huangyao Town, embodies a return to political subjection, which has much to do with the enhancement of the local state's role in society, and with the territorial urbanisation regulated by it.

The Volume of Tourism Resources: A Brief History of Huangyao

Located at the north-eastern corner of Zhaoping County, Huangyao is a town-level administrative division, with a total area of 244 square kilometres. After experiencing many bureaucratic reclassifications in the course of its history, it has currently 19 villages or sub-districts under its administration. The centre of the current Huangyao Town is the Huangyao Street Village⁴⁸ (黄姚街村, Huangyaojie Cun), and in the middle of the Huangyao Street Village is the Ancient Town, with a total area of 0.688 square kilometres⁴⁹ and 2500 permanent residents (Guangxi Urban-Rural Planning Design Institute, 2008a, p. 18). The Huangyao Ancient Town (or “the Ancient Town”, for short) is not an administrative division in the administrative system. Since all the historical sites are located within the area of the Ancient Town, this small area has become the core zone of the tourism project as well as the core of the town. **Figure 2** shows a conceptual diagram of the spatial pattern of the whole Huangyao Town. To its south was Gongqiao Township, but in order to let the tourism project of Huangyao expand further, Gongqiao Township administratively merged into Huangyao in 2005, and now functions as another core area to support tourism development (further illustration in 4.3).

⁴⁸ Huangyao Street stands at the same level as village in the administrative system. In the case of Huangyao, the Street (街, Jie) does not mean the sub district, which is a form of township-level division, as it generally does. But it does indicate an area along one main commercial street, which is the normal configuration of a Chinese town, and the centre of all the surrounded rural area.

⁴⁹ Huangyao Ancient Town, in fact, is the size of a village. Its full name is Guangxi Zhuang Autonomous Region, Hezhou shi (Prefectural level), Zhaoping County (County Level), Huangyao Zhen (Town/Township level), and Huangyao Street Village.

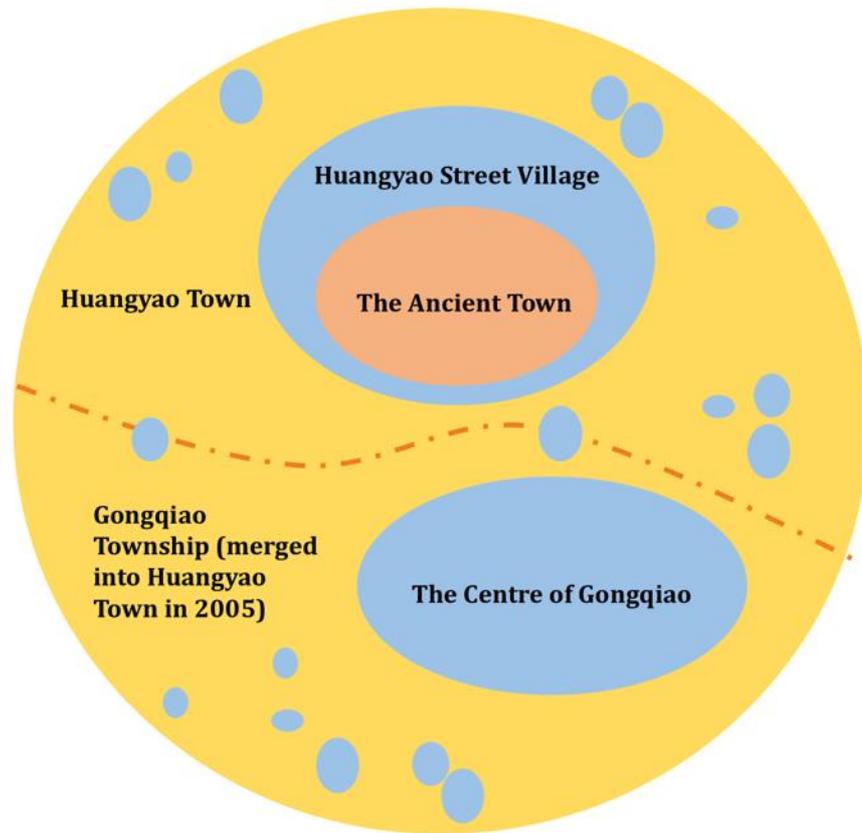


Figure 2 A conceptual diagram of the spatial pattern of Huangyao Town. *Note:* the small blue spots represent other villages under the administration of Huangyao Town. The red line represents the previous border between Huangyao and Gongqiao before Gongqiao Township merged into Huangyao in 2005. The area of each spot drawn in the schematic is not drawn to scale. *Source:* produced by author.

Before discussing the tourism development which was introduced to this area at the beginning of the 21st century, I want to scroll a little further back to the time when this Ancient Town was formed, and discuss how the town has been preserved till now. This will show better the basis on which the tourism project was grounded. I will discuss issues to do with the volume and density of the tourism resources, the social and economic base of the area, and, most importantly, whether the local culture gets on well with the tourism project model.

Figure 3. Aerial photograph of Huangyao. *Note:* The extant Huangyao Ancient Town preserves 300 ancient houses built in traditional Chinese style, typical of most of the homes built in the era. Nine old streets shape the Ancient Town with the appearance of Eight Trigrams and the Nine Palaces (九宫八卦, Jiu

Gong Ba Gua), located in the middle of Huangyao Street Village. All the old streets are paved with green-grey slate, which looks from above like a dancing dragon. Source: Official website of Huangyao Ancient Town, <http://www.huangyao.cn>

Historical records of the Zhaoping region can be traced back to the Early Qin dynasty (217 B.C.)(Shen, 1992, p. 15). Located far in the south of the empire, for a long time, this area was known as the Kingdom of Baiyue or Nanyue (a tributary of the Qin empire) (Zhaoping Land Administration, 1998, p. 12). Like many of the ancient towns and villages in south and east China which were established by prominent families migrating from north and central China after the Song dynasty, according to historical research, the forming of Huangyao also had much to do with migration (Cang, 2006, p. 92)⁵⁰. In the 17th century, due to the war between the Manchu and Han peoples during the late Ming Dynasty, many migrated from the north and central parts of the Empire to the south and east coasts. Some journeys ended in what is now Guangdong Province or Fujian Province, while others moved on to the western parts of Guangdong or even further to Guangxi. The population and economy of the area of Huangyao experienced rapid growth from this migration, and by the time of the late Ming and early Qing dynasties (16th -17th centuries), Huangyao Ancient Town had attained its most prosperous era. ⁵¹

The wealth of the population worked only as one necessary condition for the prosperity of Huangyao. In other words, according to historians, migration sparked off the ever growing conflict between the rising population and the limited land and agricultural resources (ibid., p. 95). Huangyao was a remote and closed area: the aboriginals of Huangyao were the Zhuang and Yao people, whose lives mostly relied on agriculture and few of them communicated with the people on the other side of the hills. After the migrants from Guangdong Province arrived in Huangyao in the 17th century, the extent of the conflict prompted people, especially the migrants, to look for other ways of survival.

⁵⁰ The historical background had further influence on the culture and architectural style of Huangyao (see Sections 4.4 and 5.4).

⁵¹ According to Zhaoping County Annals (Shen, 1992, 55), Huangyao used to belong to Ninghuali (宁化里) in Ming dynasty, and Guanqu (关区) in Qing dynasty. Huangyao Town was set up during the Republic of China.

Under this pressure, the inhabitants started to form trading businesses, which then led to Huangyao's most glorious period.

One historical study of the road constructed by the migrants records how the current Huangyao Town was formed and describes the process by which the migrants acquired the actual governance of this area (Mai, 2008). Here we may catch a glimpse of what role infrastructure construction plays in the rise of an area. In the early Qing dynasty (late 1600s AD), the local community of Huangyao contained two influential groups: one was the Eight Clans, and the other was the Zhuang people⁵². The Eight Clans consisted of migrants from the west part of Guangdong province⁵³, whose ancestors had migrated to Southern China from north and central China, in order to avoid the chaos caused by the war between the Southern Ming with the Qing dynasty. Keen to protect themselves and gain power after settling down in Huangyao, the Eight Clans initiated the construction of a road⁵⁴ together with the nearest county level government in the Central Empire⁵⁵. By lubricating the tax collection channel between itself and the central government, Huangyao merged itself into the central empire, and the household and land registration advocated by the Eight Clans was confirmed through the subsequent payment of tax (Mai, 2008, pp. 111–113). Over time, the authority of the Big Eight Clans was established and stabilized by its use of the tax channel. This became a physical route to facilitate the movement of taxes, whether in kind or in money, and inevitably the movement of abstract ideas and relationships. The remote location and the difficult traffic conditions in the surrounding area prompted the people of Huangyao to use the limited transportation infrastructure for moving goods and making business deals. From then on, Huangyao also became the commercial centre for the surrounding towns and villages and reached the zenith of its prosperity. As a simple and original example of infrastructure, the road which was built in the 17th century connected the Huangyao area with wider social, cultural, and economic networks and boosted the rise of Huangyao Town as the centre of the

⁵² The Zhuang people (the original character for Zhuang was “僮”, later replaced by“僮”, and finally changed to “壮”). are the indigenous residents of the Huangyao area, and also the ethnic group which mostly lives in the Guangxi Zhuang Autonomous Region of China.

⁵³ Located in the east of Guangxi, Guangdong is the province where the migrants from the north first arrived.

⁵⁴ In ancient times, one of the main functions of roads was to bring the taxes to the central fiscal body.

⁵⁵ From the early 1700s to the mid-1800s, Huangyao local authorities (including the Big Eight Clans) and County government built and repaired the road between Huangyao Town and Zhaoping County.

neighbouring area. Nowadays, what can be seen of the Ancient Huangyao Town, such as the houses, the theatres, the temples, and the ancestral halls, are the material relics of the wealth accumulated during its heyday. Most of the houses etc. that constituted the Ancient Huangyao Town were built by the Eight Clans and their descendants. The ancestral halls of these families are still well preserved in the Ancient Town today and the descendants of these families still practise ancestor worship at the more important traditional festivals.

However, Huangyao's status as the centre of the entire area was weakened after 1949. In the socialist period between 1953 and 1978, the private sector was abolished; transforming the shopkeepers into farmers and agricultural workers once again became the only means of survival for the people of the area. In the meantime, since modern transportation had brought it within reach, Huangyao was no longer an opportunity to be taken, but more like its fatal weakness. Further, in 1958, when the Huangyao Commune⁵⁶ (黄姚公社, Huangyao Gongshe) was established, the Commune centre moved to Gongqiao, a place in the south of Huangyao, with a flatter terrain, making it more convenient to construct a new centre for the region there. In this way, the ancient buildings in the Huangyao Ancient Town avoided demolition or reconstruction (Cang, 2006, p. 98). Even after the reform and opening up, the economic situation of Huangyao did not improve. As discussed above, the geographic location of Huangyao is some distance from modern transportation links, making travel to and from the town inconvenient. While rapid development changed the eastern areas of China, this area has remained undisturbed, surrounded by its hills and rivers, and life has stalled in the last few decades. Those who live here still maintain a traditional way of life. The livelihood of Huangyao Town still relies on agriculture, and it has almost no modern industries except for some inherited cottage industries such as making pickles and fermented soya beans.

Huangyao had its good time in history, and luckily avoided all the factors which could have changed it during its bad years. The glorious history together with the objective

⁵⁶ From 1958 to 1984, the entire area of the current Huangyao Town was under the administration of the Dong Fang Hong Commune (also known as the Huangyao Commune from 1958 to 1961, and Huangyao Qu from 1962 to 1984). At the time, Huangyao was merely a village in the administrative system. The centre of the Commune, including all the administrative offices, was located in Gongqiao. Gongqiao was then the centre of the whole Commune. Before the foundation of the Household Contract Responsibility System in 1984, the Commune was the administrative unit in China's collective ownership era.

evidence of preservation gives Huangyao a character distinct from other towns and villages in the area, which makes Huangyao a quite competitive resource when there were few signs of a tourism economy. Just like other ancient towns and villages forgotten among the mountains and rivers, Huangyao gained increasing popularity as a sightseeing venue. In this context, the tourism industry becomes almost the only feasible economic growing-point that Huangyao's development can rely on. Shaking off poverty⁵⁷ is also an important goal for both local residents and local government. As a result, Huangyao's history, landscape, and the lives of Huangyao's residents, become valuable resources and even commodities in the tourism industry.

The Construction of Infrastructure and the Changing Geographical Experience

Besides the nine old streets which are constructed of slate, whose historical appearance attracts tourists' interest, there is one concrete road called New Street (新街, Xinjie), on the north side of the nine old streets, just outside Huangyao Ancient Town. Although it is outside the wall of the ancient town, New Street played an important role in the tourism development of Huangyao. When people mention Huangyao Ancient Town, they generally mean the nine old streets in the Ancient Town and the New Street at the entrance. The New Street was built in 1984, when Huangyao Town became independent of the Huangyao Commune⁵⁸. According to the Zhaoping County Annual, a cinema, a hospital, a post office and several small shops were built on the New Street (Shen, 1992, p. 46). As time went by, 2-3 floor buildings were gradually constructed on the north side of the street. Since Huangyao Ancient Town has brought in more jobs and business opportunities, more and more people are now living in the buildings on the New Street. The ground floors of the new buildings have been developed as small shops and restaurants, and the rooms on the upper floors are kept for residential use. Most of the people who live on New Street are local residents or residents from nearby townships and villages. Some local residents have also moved from the old streets in the Ancient Town to New Street, in order to lease their old houses inside the Ancient town to tourist letting

⁵⁷ Between 1999 and 2002, according to the County Annual Report cited in Hongjie Xu's research, (2011, p. 13), the population of Huangyao Town was nearly 10,000, with an annual total fiscal revenue of 425,000 RMB. This meant that the fiscal revenue per capita was less than 600 RMB per year. 3 out of its 6 villages suffered from poverty.

⁵⁸ In 1984, the Huangyao Commune broke into Huangyao Town and Gongqiao Township.

agencies. By the time I first arrived in Huangyao in the summer of 2015, the New Street looked like a typical high street in a town centre. Alongside the street were small businesses, restaurants, and hotels one after another. The buildings were recent and had a totally different look from the idiom of the Ancient Town.

18 months later, when I made the second fieldwork visit in the spring of 2017, the entire street had been transformed and now had a tourist-friendly appearance. All the shops alongside the New Street had adopted a unified and olde-worlde look, which extended eastwards until it reached the main entrance of the Huangyao Scenic Area. Later I found out that this change was in deference to the *Protection Plan of Huangyao as the National Famous Historical and Cultural Town*, designed by Guangxi Urban-Rural Planning Design Institute in 2008 (for detailed information about the protection plan and the county government's operation, see Section 5.3). Rated as a famous historical site, the New Street had to be transformed into a commercial street that mimicked the appearance of Ming and Qing streetscapes (Guangxi Urban-Rural Planning Design Institute, 2008a, p. 53). The specific transformation was carried out on the façades of buildings that lined the street (Guangxi Urban-Rural Planning Design Institute, 2008b, pp. 17–18). It is planned to invest 5.4 million Yuan in total between 2018-2015 (ibid.). For the first stage, between 2008-2010, 1.8 million Yuan was allocated by the state, and the other 1.8 million Yuan was self-funded (Guangxi Urban-Rural Planning Design Institute, 2008a, p. 56).

The local state played a critical role especially once the tourism project was initiated. To transform Huangyao Ancient Town from a residential village to a tourist-friendly attraction has been on the agenda of the local government since the end of the 1990s. Zhaoping County Party Committee and County Government founded Huangyao Tourism Development Ltd. in 1999, and the chief of the County Tourism Bureau as general manager, was in charge (Xu, 2011, p. 14). This officially launched the development of the tourism project of Huangyao. Huangyao Ancient Town was one of the two National Debt Projects in the Guangxi Autonomous Region. In 2001 Huangyao became a demonstration project to “Develop the Construction of Small Towns by Tourism” (以旅游带动小城镇建设, Yi Lvyou Daidong Xiaochengzhen Jianshe), and got 6,900,000 RMB (about 690,000 GBP) from the central, regional, and county government to improve the condition of the infrastructure. Besides, local government also supplied 18,000,000 RMB (about 1,800,000 GBP) from the State National Debt Special Subsidies for the West (国家西部国债专项补助资金, Guojia Xibu Guozhai Zhuanxiang Buzhu Zijin), which

was invested in 23 kilometres of road construction from Zhongshan to Huangyao, and 4,000,000RMB (about 400,000 GBP) to repair the pavements and historical attractions in the ancient town. During this process, some illegal constructions which had a negative impact on the unified ancient appearance of Huangyao were demolished, and some of the old buildings and streets which belonged to the area of the Ancient town were repaired (Guangxi Urban-Rural Planning Design Institute, 2008a)⁵⁹. From the official perspective, the development of the Huangyao project during the first ten years of the 21st century has achieved great things. The ancient town was listed in 2007 in the catalogue *China's Historical and Cultural Towns* (Zhongguo Lishi Wenhua Mingzhen 中国历史文化名镇) (for detailed information on local government's operations, see Section 5.3), and two years later it was rated as a national 4A⁶⁰ Tourist Attraction.

If we look beyond the scope of Huangyao, we find that in addition to the changes in the neighbourhood of Huangyao, infrastructure construction on a larger scale is changing this town with its disadvantaged location. Since transportation is a critical issue for areas surrounded by mountains and hills, much effort and investment have been put into improving the transportation infrastructure in Huangyao and, more generally, the great southwest of China. Two expressways have reached the Huangyao Scenic entrance one in 2009 and the other in 2013⁶¹, which make a more convenient connection between Huangyao and the neighbouring areas in Guangxi and Guangdong. The High-Speed Railway (HSR) has brought it even better connectivity. A newly opened Guiyang-Guangzhou High-speed Railway (HSR) has reached Hezhou, the prefectural city which Huangyao belongs to in the administrative system (shown in **Figure 4**). This railway line is part of the first HSR to cover the mountainous area of China; it connects the less developed southwest of China with the well-developed Pearl River Delta in Southern

⁵⁹ Detailed information is documented by *The Protection Plan of Huangyao as a National Famous Historical and Cultural Town, Specification [Huangyao Guojia Lishi Wenhua Mingzhen Baohu Guihua, Suomingshu]*.

⁶⁰ See Footnote 15.

⁶¹ Wu-Gui expressway (from Wuzhou to Guilin) is the first express highway passing close to Huangyao. Set to be fully running in 2019, the Wu-Gui expressway links Huangyao to two main cities (Wuzhou and Guilin) in Guangxi Province. In 2013, the Guang-He expressway (from Guangzhou to Hezhou) was opened to traffic. This expressway not only connects Huangyao with Guangzhou, which is the capital city of Guangdong province, but also significantly improves the quality of traffic between Guangxi and Guangdong province.

China⁶². With the aim of setting up an HSR Economic Zone in the southwest, the construction of the HSR has the further purpose of encouraging the free movement of technology, labour and economic investment. However, the Gui-Guang HSR line is only a small part of the overall Chinese HSR plan⁶³. Only by putting the regional case of Huangyao and the southwest China into a broader picture of the HSR construction, can the significant changes brought by the connections of the physical infrastructure be realized.

Figure 4. The Schematic of the China High Speed Railway Network. Note: The rail line circled in red is the Gui-Guang HSR Line. The red spot within the red circle refers to Hezhou. Huangyao is located in the southwest of Hezhou, which cannot not be seen from the map. Source: The copyright of the network schematic belongs to Gaotie.cn. The red circle and spot are the work of the author.

As mentioned at the beginning of this chapter, in 2005, China started the New Socialist Countryside Construction (社会主义新农村建设, Shehui Zhuyi Xinnongcun Jianshe) movement. One of the main investments was to use public money to support the construction of infrastructure systems in rural areas. The infrastructure systems, such as electricity, fiber-optic cables, highways, and stretches of High Speed Railway working as channels, play a very important role in setting up connections between the vast areas of countryside and the developed areas, which has brought in a new wave of urbanization.

The “objective qualities of space and time” and “how we represent the world to ourselves” have been altered by the concept of “time-space-compression” (Harvey, 1989, p. 240). At the same time, since the movement of goods and people as become more and more frequent, the “container” view of space is no longer acceptable (Harvey, 1969, p. 212),

⁶² Aiming at building a modern transportation hub for the southwest China, the central government and three provincial governments decided to construct this HSR line together. 90 billion Yuan was invested by the central and provincial authorities, and 50% of the investment was from bank loans (Guangzhou Daily, 2014).

⁶³ The HSR construction has been expanded to 28 provinces since its inception in 2007. The operating mileage of HSR in China is over 16 thousand kilometres, which contributes to more than half of the track mileage of HSR in the world. As in Huangyao and southwest China, HSR has effectively connected many parts of China.

and distance “can be measured only in terms of process and activity” (ibid., p. 201). Process and activity inspire us to think that what has been changed by the construction of infrastructure should not be understood only within the physical realm. Moreover, it contains soft elements which define our experience of space. Through the experience of encounters with infrastructure, we consider space as an “interactional and cultural construct” (Dourish and Bell, 2007, p. 417). Therefore, instead of thinking of places as areas with physical boundaries around them or with physical distance in between, we can imagine them as articulated moments in networks of social and political relations (Massey, 1991). As Larkin (2008) argues to emphasise the part played by infrastructure in mediating the urban experience historically and spatially, “urban space is made up of the historical layering of networks connected by infrastructures” (ibid., p. 252). Following this idea, our discussion of the building of roads, railways, and express highways, above, turns into a discussion of the way in which a physical transportation connection can promote the social and political status of a particular place.

Accordingly, we should not view the restoration of a town such as Huangyao as an isolated case of rural tourism development. Instead, it reveals complicated social and political relations which materialize in the form of massive infrastructure networks that shape the growth of its tourism development. In order to understand the infrastructural experience in the process of Huangyao’s urbanisation, in the next section, I shift the focus from infrastructure to the broader topic of territorial urbanisation, which is a model of land-based development in which the infrastructure contestation of Huangyao town is contextualized.

4.3. From Tourism to Land-based Development

This section investigates how Huangyao was transformed into a touristic oriented project in practice, and how this project was carried out in space. The local states⁶⁴ always set up the developmental agenda and at the same time regulate the territorial urbanisation. Throughout the process, local governments have dominated almost the entire agenda.

⁶⁴ In chapter 5, I further explain the up-scaling politics of the Huangyao project, that is, transferring the project from the Ccounty government’s authority to the prefectural city level. There is an up-scaling effect on the construction of infrastructure as well.

Working under an ideology of “high modernism” (Scott, 1998)⁶⁵, the abstract strategies will first be translated and set in motion by the planning institutions, which scientifically calculate and technically relocate the population and the land use within the target area on the map. Inspired by the further argument by Scott that “the transformative power resides not in the map ... but rather in the power possessed by those who deploy the perspective of that particular map” (ibid., p. 87), this study further examines who the actual players are besides the planners. Since scientific planning functions as fundamental for the further development of this area, it reveals that in drawing up the plan, the planners are inevitably influenced by the will of the local state and the developers, behind which is the story of land speculations including land requisition and compensation, land financing of the local state, and sometimes the dispossession of the local residents against a background of territorial urbanisation.

Justifying Huangyao as a Rising State-led Tourism Project

If we put it in the bigger picture of Hezhou as a whole, the project of Huangyao looks more ambitious, not just an isolated tourism project in a remote neighbourhood. The early achievements and the experience from the first ten years of tourism development of Huangyao gave the leaders more confidence, especially when the important link between the ecology of the environment and economic development became the ideological connotation (Shin and Zhao, 2018). In 2005 when Xi Jinping was visiting the village of Yucun in Anji County, Zhejiang Province, the slogan “clear waters and lush mountains are the gold and silver mines” (绿水青山就是金山银山, Lvshui Qingshan Jiushi Jinshan Yinshan)” was first proposed. Its upgraded version was proposed ten years later during the 5th Plenary Session of the 18th CPC Central Committee as “Green Development, or ECO Development”, (绿色发展, Lvse Gazhan)⁶⁶. In a place such as Hezhou sitting amidst splendid green resources, the beauty of nature and the leisure of rural life can be more highly valued than ever. The strategy to develop its ECO and health related industry is

⁶⁵ By using the term “high modernism” here (from James. C. Scott) to refer to the “transformative state simplifications” (Scott, 1998, p. 4) which impose order on nature and society for administrative purposes.

⁶⁶ Detailed explanations can be found in *Outline of the 13th Five-Year Plan for the National Economic and Social Development of the People's Republic of China* (NPC and CPPCC, 2016).

labelled “the Rise of Green” (绿色崛起, Lvse Jueqi)⁶⁷. Here, the breakthrough points are set in three counties, Zhaoping, Fuchuan, and Zhongshan, all named the “Hometown of Longevity” (长寿之乡, Changshou Zhi Xiang). In addition, four towns, including Huangyao, are defined as prefectural-wide tourist centres. Specific to one of the towns, Huangyao, in 2013, the county government submitted a 5A Tourism Attraction application to the China National Tourism Bureau to increase its publicity and facilitate the further development.

Since the Huangyao Area has suffered from poverty for some decades, one key method of mobilizing the locality to cooperate the tourism development project is to combine “poverty alleviation” (脱贫, Tuo Pin) with the tourism economy. Eco-tourism as an industry and the health industry are treated as opportunities for escaping from poverty and the further economic development of Zhaoping County. “Choose a scenic spot, drive the development of a place, get one group of people out of poverty (开发一个景区, 带动一方发展, 脱贫一批群众, Kaifa yige jingqu, daidong yifang fazhan, tuopin yipi qunzhong)” is proposed as one objective and it has had a positive impact on the Huangyao locality⁶⁸. Similarly, as we see on the website of the Guangxi Huangyao Ancient Town Tourism Culture Industry Area Management Committee (广西黄姚古镇旅游文化产业区管理委员会, Guangxi Huangyao Guzhen Lvyou Wenhua Chanyequ Guanli

⁶⁷ The notion of the Rise of Green first appeared when the Party Secretary of Hezhou was interviewed by People.cn, the online version of the People’s Daily. The original headline was “生态健康产业助推长寿贺州‘绿色崛起’——市委书记赵德明全国‘两会’期间接受人民网专访”(Ecological Health Industry Promotes Longevity in Hezhou’s Rise of Green’ – Party Committee Secretary Interviewed by People.cn during the National ‘Lianghui’ (NPC and CPPCC)). Data retrieved from http://finance.ifeng.com/a/20160314/14268194_0.shtml

⁶⁸ This discourse appears three times in official media reports. The first time was March 14th, 2016, when the Party Secretary of Hezhou was interviewed by People.cn during NPC and CPPCC, published by the Hezhou Daily. The second time it appeared was October 14th, 2016, in the People’s Daily Overseas Edition, with the original headline of “广西贺州市：托起贫困山区群众的致富梦” (Hezhou City, Guangxi: Supporting people’s dream of getting rich in poor mountainous area) . The third time it appeared was January 15th, 2017, in the People’s Daily (人民日报, Renmin Ribao), with the original headline of “按需扶贫拔穷根：广西贺州扶贫政策精准发力，一年脱贫 9.1 万人”(Poverty alleviation on demand, pulls out the poverty roots: Guangxi Hezhou’s poverty alleviation policy is precise, and 91,000 people are out of poverty in one year).

Weiyuanhui, HTIMC for short)⁶⁹ (for further explanation see 4.3), the tourism industry of Huangyao found it a good opportunity to actualize “corner overtaking” (弯道超车, Wandao Chaoche)⁷⁰. It is the way of justifying the project of forming a tourism industry in Huangyao as a shortcut whereby the entire region can graduate from poverty and its people can lead a better life.



Figure 5. Slogan attached to the buildings of the Huangyao town government. Notes: It is written on the wall that “the tourism industry is a beneficent cause, a happy industry, and a great business for enriching the people” (旅游产业是幸福事业, 快乐产业, 富民大业, Lvyou Chanye Shi

⁶⁹ In October 2015, the Guangxi Huangyao Ancient Town Tourism Culture Industry Area Management Committee (Guangxi Huangyao Guzhen Lvyou Wenhua Chanyequ Guanli Weiyuanhui 广西黄姚古镇旅游文化产业区管理委员会, HTIMC for short) was established.

⁷⁰ Data retrieved from official website of the HTIMC, retrieved on April 17th 2018, from <http://www.hycyq.gov.cn/index.php/item-list-category-7393.html>

Xingfu Shiye, Kuaile Chanye, Fumin Daye). *Source*: Photo taken by the author in August, 2015.

Against the background of Huangyao's generous tourism resources ripe for development, the Ancient Town and the surrounding area have gradually been reframed in a project to attract the tourist economy. As the ideological connotation that the Huangyao tourism project is part of "the Rise of Green" strategy, which is also closely linked with poverty alleviation, was being set up, the town of Huangyao got ready to work as the foundation for further ambitions. The remaining work on the construction of Huangyao has now moved far beyond the simpler kind of infrastructure or the repair of ancient buildings. Rather, the space occupied by Huangyao is to be made use of in the process of territorial urbanisation, where the local state is to make itself the leader. I want next to illustrate the mechanisms through which this process has been unfolding.

Planning for Growth: Population and Land

By the year 2005, the laws defining Gongqiao Township, south of Huangyao, were repealed, and all the villages belonging to the administration of Gongqiao Township were merged under the same authority as Huangyao Town. In this way, Huangyao Street Village which is the centre of Huangyao Town, has become the centre of the entire Huangyao area. After the merger, the new Huangyao was calculated to have a total area of 244 km². The merging of Gongqiao and Huangyao has expanded Huangyao's territory and population, which makes it easier to integrate units and allocate resources. The urban planners of Shanghai Tongji Urban Planning and Design Institute were invited to make a plan for the New Huangyao, in particular for the town planning area (镇规划区, Zhen Guihuaqu) of 41.65 km², within which there is a 6.74 km² construction area (镇区, Zhenqu) defined as the core development area for the new town centre, including the old Huangyao Town Centre in the north, and the old Gongqiao Township Centre four kilometres away in the south.

"Planning a new town is the core work of our project" (interview number I180130, Shanghai), I was told by a planner who played a key role in the planning team of the Huangyao Town project. From interviews with the planners and engineers who made the plan for Huangyao, I learned how the area was calculated for construction of a town, and how the population within the town was chosen so as to facilitate the town construction. "The main purpose of the master plan is to draw up a certain area, on the ground of which

further construction can be made”. This purpose can be understood as either to create guidelines for further construction, or to legitimize the implantation of a plan (Wu, 2015) for developing eco-tourism. The planning of the land for construction entails the redistribution of people, or, conversely, a certain size of population must be allocated a certain area of construction land (see **Figure 6**, **Figure 7**, and **Figure 8**). The matching of land and population also determines that the discussion should attend equally to spatial and social changes.

Figure 7 and **Figure 8** show clearly this matching. “Many villages (referring to village communities) were moved here while the plan was being made.” The planner describing the relocation of people pointed to the 6.74 km² construction area. The villages which will soon be relocated mostly fall within the 41.65 km² town planning area. People in these villages will be relocated to the residential area within the 6.74 km² construction area shown in **Figure 7**, and there will be no place with the name of “village” as there used to be. Instead, these people will be counted as part of the urban population, which contribute the dramatic increase in the proportion of urban population from 26.03% in 2008 to 40.10% in 2009 (see **Table 2**).

Comparing **Figure 6** with **Figure 7**, the transformation of Huangyao from scattered traditional villages and agricultural land to a concentrated newly planned town can clearly be traced. What can be seen from **Figure 6** is that most of the newly designated construction land for this concentrated development comes from land where nothing has been built, such as agricultural and forestry land (marked in light green). Easier for construction than working on village buildings and on land in the area that has already been used for construction, this “available land” does not involve the work of demolishing and reconstructing before further construction can begin (Hsing, 2010, pp. 124–132). Besides the well-planned area in **Figure 7** which is highlighted in different colours indicating different functions, there is an area coloured light grey with shade, indicating that such areas will be used as backup land as soon as the development needs to expand.

From my field work, I learned that the ground of Huangyao is being spatially transformed, but it is still quite far from the plan as shown in **Figure 7**. The centre of current Huangyao is a typical of a town centre in scale: one main street runs alongside the trans-meridional New Street, which is the only main street at the moment. The old town centre (the Ancient Huangyao town) spreads out on the south side, and some new residential areas with scattered shops and restaurants are rising on the north side. Past the newly built residential

areas towards the north, there is still farm land, village houses, and unused spaces. It becomes necessary to analyse this spatial transformation not only to discover more about the planning mechanism, but also to explore how far such plans, through which the economic and political goals are realized, are actually achieved through the concrete operations of key agents. The next sub-section discusses how the master plan was used by local government to achieve development purposes through compromise on the part of the planners.

Figure 6. Land use status at the time the planning started in 2008. *Source:* Master Plan of Huangyao Town, Zhaoping County (Shanghai Tongji Urban Planning & Design Institute, 2012b, p. 14). *Notes:* (1) Within the red dotted line is the 6.74 km² construction area for development, most of which is occupied by villages and agricultural land marked in light yellow and light green. (2) Within the pink dotted line is the 41.65 km² town planning area. (3) The Huangyao Ancient Town is marked in purple in the upper-middle part of the figure. (4) All the dark green areas are collectively owned woodland, which is considered a natural resource for eco-tourism. There is one reservoir, highlighted in blue, on the left side of the map. Near the reservoir, there are three pieces of dark green land encircled by the red dotted line, which will be used as potential construction land.

Figure 7. Construction land use plan for 2010-2030. *Source:* Master Plan of Huangyao Town, Zhaoping County (Shanghai Tongji Urban Planning & Design Institute, 2012b, p. 19). *Notes:* (1) Within the red dotted line is the 6.74 km² construction area for development, most of which is relocated for different uses of land marked in different colours. (2) Within the pink dotted line is the 41.65 km² town planning area; inside it is an area marked in light grey shade, to show that the land might be re-allocated to construction according to future demand. (3) The Huangyao Ancient Town is marked in purple in the upper-middle part of the figure.

Figure 8. Administrative village adjustment and village relocation plan. *Source:* Master Plan of Huangyao Town, Zhaoping County (Shanghai Tongji Urban Planning & Design Institute, 2012b, p. 7). *Note:* (1) The green dots represent the villages which will be relocated during the construction of the new town; numbers under the dots marked in grey show the village population before relocation. (2) The purple dots mark the villages that will stay; under

the dots, the grey numbers refer to the population before the relocation, and the black numbers refer to the population after the relocation. (3) Within the purple dotted line is the 41.65 km² town planning area, within which are most of the green dots. (4) Through the relocation, small villages will disappear, either by merging into big villages, or being counted as the urban population.

	2002	2003	2004	2005	2006	2007	2008	2009
Total Pop. in town planning area	56235	56785	57188	55549	56159	57030	56788	58358
Registered Pop. in construction area	11536	11860	12161	12013	12367	12648	12884	20953
Temporary resident Pop. in construction area	1531	1590	1625	1650	1725	1828	1900	2447
Urban Pop.	13067	13450	13786	13663	14092	14476	14784	23400
Urbanisation level (%)	23.24	23.69	24.11	24.60	25.09	25.38	26.03	40.10

Table 2. Urbanisation level of Huangyao from 2002 to 2009. *Source:* Master Plan of Huangyao Town, Zhaoping County (Shanghai Tongji Urban Planning & Design Institute, 2012a, p. 29). *Note:* (1) The “Urban population” adds the “Registered Pop. in construction area” to the “Temporary resident Pop. in construction area”. (2) Then the urbanisation level equals the “Urban population” divided by the “Total Pop. in town planning area”. (3) The total population of Huangyao did not increase dramatically from 2008 to 2009, but the urban population experienced a huge increase due to the relocation of the village people.

Land Speculation and Tourism Development

From the above discussion, we can see how the tourism project was created by actual planning through treating the land and population as resources for allocation. However, what can be seen from the map is the planning result which is already apparent. In this sub-section, I focus in two steps, in which the plan, as well as the process of planning, work as part of the mechanism for attaining political and economic goals. In the first step I trace the negotiations between planners and local government. Then I show how the plan was used to justify land transfer in practice.

According to one of the above interviewees, normally the backup land is not used in the actual development. Even with the conventional construction land, whether or not it can

be made available is still in question, since, to begin with, the town level government has limited financial resources. Therefore, the construction of public utilities, such as kindergarten, schools, and hospitals, has to depend on support from a higher level government, such as the county. Second, the planned area seems much bigger than necessary:

“Instead of moving to their town centre, local people would like to choose the county or city centre, which has larger population and better supporting facilities; otherwise they might still stay in their villas. A town centre does not attract many local people, so a small residential area would be enough. This large residential area drawn on the plan of Huangyao is mostly for the benefit of the tourism related development, perhaps intended for tourism real estate. Tourists are attracted by the landscape and the tourism project.” (interview with a planner, February 5th, 2018)

The tourism related development is still the core of the town’s planning, and the planners believe that they have limited agency in their negotiations with the core agents of the development. Unlike the master plan shown by **Figure 7**, the original draft shows Gongqiao, the cluster in the south, as the main target for the town development. Since the Gongqiao area has flatter terrain that is more accessible to traffic, about 80 percent of the construction land, including the main residential areas as well as the shopping streets, was not planned in to be in Huangyao at all, but in Gongqiao. Only 20 percent of the construction land in current Huangyao came from north of the New Street. Moreover, only some light and less intensive development, such as public services and ecologically friendly development, was indicated by the planners in the Huangyao area in order to preserve its landscape.

According to one of the planners, the Department of Construction of the Autonomous Region (Provincial level) and the Bureau of Construction of County and Prefecture Government agreed with the planning team from Shanghai. However, the original plan was rejected in the discussions with the county and prefectural level government. These two levels of government, which are generally classified as local government, have more of a concern for economic development than any of the construction departments. “I’ve talked to the party secretary of the local government”, said the planner, “I could tell that they did understand our original proposal. However, there was dilemma. For the government, or maybe for this region, the longing to develop is their first concern.” This pressure for development comes from their current impoverishment and the combined

ideological connotations of poverty alleviation through the development of this Huangyao tourism project (see Section 4.2). Sticking to development gives them their legitimacy, as well as being the only way out, and leasing the land to attract investment is the concrete and effective means of securing such development (Zhao, 2017). As a result, in the name of development, they can legitimize the collaboration between the local state and the investors.

The investors were attracted by the branding of Huangyao Ancient Town as a National Historical and Cultural Town, as well as a National 4A Tourism Attraction for further economic profit; hence they were not willing to settle in Gongqiao. If the priority of planning had not shifted to Huangyao Ancient town by way of giving the area around the Ancient Town more land on which to develop, these investments would have moved to some other place. “Our original plan was challenged by the local government. In the same way that so many investment projects have already been discussed and promised, planners should give these investment projects some construction land to implement their projects.” There are two pieces of land marked in red at the north east of the ancient town, in the upper-right of **Figure 6** and **Figure 7**. As the planner remembers it, at the very beginning when the tourist project was launched and before the master plan was made, the land contract had already been drawn up between the local government and Huangyao Ancient Town Cultural Tourism Ltd.⁷¹ (hereafter called the Tourism Company (旅游公司), Lvyou Gongsi) for short. More details of the relationship between the county government and this company are discussed in Section 5.3). Although the planners

⁷¹ In 2003, the county government officially announced its intention to attract investment to develop tourism in Huangyao. In July 2003, Huangyao Tourism Development Ltd. (founded by the county government; see Section 4.2.), and Guangxi Gui Neng Electric Power funded Huangyao Ancient Town Cultural Tourism Ltd. Guangxi Gui Neng Electric Power owns 85% of the shares and the county government holds the other 15% (Xu 2011, 16). Two months later, in September, Zhaoping County government transferred the development and management rights to Guangxi Gui Neng Electric Power. These rights last for 50 years (from 2003-2052). In this way, the development and administration rights for Huangyao Ancient Town were separated from the county government. Huangyao Ancient Town Cultural Tourism Ltd., which is owned by Guangxi Gui Neng Electric Power, is responsible for all aspects of tourism development in the Ancient Town. This company owns all the rights to this area, except for 15% of the income right, which still belong to the Zhaoping County Tourism Bureau. Although the development and administrative rights are separated, Zhaoping County government and Guangxi Gui Neng Electric Power are still the actual owners of the tourism project of Huangyao Ancient Town. They are the investors and shareholders of Huangyao Ancient Town Cultural Tourism Ltd. Local governments plus investors are the major participants of tourism development.

originally meant to drag land for construction to Gongqiao in the south, and design a protective scheme in Huangyao to safeguard the natural landscape and protect the upstream water sources, they had to compromise in the end, otherwise this plan would not have been able to go forward for approval to a higher authority.

By the time a master plan is passed, it has become the official framework for the further construction and management of a certain place; or, the other way round, all the regulations in accordance with the master plan are endorsed and legitimized by it as a legal document. The property rights and the nature of the land will change according to the plan. Specifically, the land which had been owned by village collectives will be converted to state-owned land⁷², and in the meantime the land which used to be agricultural land will be transformed into construction land according to one particular use marked in the master plan (Hsing, 2006, 2010; Lin, 2009; Wu, 2015). The changing of ownership and the transformation of land use is commonly known as land acquisition (征地, Zhengdi), through which the villagers receive a sum in compensation, with an agreement⁷³ on the land price between the local government and the village collective. With the land it has in hand⁷⁴, the local government first submits a plan to a higher authority for approval; second, it calls for bids for this piece of land; third, it leases the land to the bid winner. The “income” as a land transaction derives from deducting the costs of the land transfer, including the compensation for land paid to villagers, the costs of infrastructure construction, and the required labour costs. The rest counts as revenue

⁷² The rural land in China is strictly divided in terms of land use and land property rights. In order to ensure food safety, agricultural land cannot be converted into construction land at will. By the year 1983, the Household Contract Responsibility had been officially implemented in rural China. Through the village collectives, as well as non-agricultural rural enterprises, rural households retain their own house (and the land the house occupies), and share collective ownership of the agricultural land through the village collective. Individual households have the right to use, manage, or lease the use rights of the piece of land for which they have a contract with the village collective. Through land acquisition, the collectively owned agricultural land is transformed to state owned construction land. Although the state is the owner of the land, the municipal governments or prefectural city governments are the actual regulators.

⁷³ It is hard to figure out whether there is an agreement or not. It is not unusual to see forced land acquisition and violent demolition of the buildings for the sake of land in China. In Huangyao, there were also disputes caused by land acquisition, which then led to a demonstration. In section 4.4, I go further into this issue from the perspective of the local community.

⁷⁴ The central state is the legal owner of the land. In fact, however, throughout the process, the local state works as the leading agent.

for the local government⁷⁵. Sometimes the local government gives a discount on the land price in the sale to the developer. In return, the developer is responsible for constructing the infrastructure supporting the land. It is known as a common way for local government to finance the construction of infrastructure through land revenue (Wang *et al.*, 2011).

From the above two sections (Sections 4.2 and 4.3), it can be seen that the tourism project of Huangyao was conceived as an eco-tourism project to contribute, officially, to economic development and poverty alleviation. It was then technically and systematically practised by making plans, in which the local government had a critical influence on the planning process and on legitimizing the regulation of land transformation and transactions (Hsing, 2006, 2010). In the end, cooperation was achieved with the developers, who are viewed as the second key participants, next to local government itself, in the land-based accumulation and growing sovereignty of the local state. With their already extensive bureaucratic power, local governments were well situated to launch rapid economic development. The behaviour of this local entity was quite typical, not only of those with rural tourism projects to develop, but as a legacy of the institutional changes of the post-Mao reforms that “injected strong economic incentives for local government to become bureaucratic entrepreneurs” (Oi, 1995). This activity of transforming rural economies into urban real estate dealers or heavy investors in the built environment is also known as “speculative urbanism” (Goldman, 2011; Chien, 2013; Shin, 2014; Shin and Zhao, 2018).

Utilitarian discourse justifies the implementation of a tourism economy in Huangyao by highlighting it as a place with great tourism resources. However, from an anthropologist’s perspective, little attention has been paid to the everyday interaction between the local residents and the transformation of their town. In other words, few remember that Huangyao is not only a development oriented project, but is also a town where people actually live. Especially within the Ancient Town, where most of the local residents of Huangyao Street Village live, the land property struggle has become a big problem that hinders it from adopting the same development model as the new town. This is a critical point from which we may identify how the problems in this research over property rights

⁷⁵ According to the Land Management Law (2nd revision in 2004), 30% of the revenue goes to central government. 20% normally goes to provincial level, 20% goes to prefectural level, and the remaining 30% is divided between county and town/township level governments.

and land-based urbanism contribute to the problematic electricity infrastructure. In the next section, I discuss from the micro level the transformation of Huangyao from a town to a tourism project. I focus particularly on the way in which the land transfers make the local community and the local government exclude each other from the tourism project, which leads to further problems of upgrading the electricity infrastructure.

4.4. A Public Project without the Public

As shown in 4.2 and 4.3, a new Huangyao with an ambitious strategy is rising around the Ancient Town of Huangyao. However, at the same time, far from the official image of Huangyao as a flourishing project, another Huangyao exists in the everyday experience of the local community, whose main participants are local residents and individual business owners. Through observation and interviews during the fieldwork, I found that people felt anxious and showed apathy towards the tourism development project rather than participate in it enthusiastically. This is particularly obvious among local residents. They have been observing and doubting whether their lives could benefit from or indeed have anything to do with the state-led tourism project now in full swing, and some of them hold contradictory and even negative ideas.

Huangyao Landscape Avenue (黄姚景观大道, Jingguan Dadao) is 1686 meters long and 38 meters wide, connecting Huangyao town with the entrance to the Gui-Wu expressway. According to Huangyao Town Government, this road construction cost 66,320,000 RMB (about 7,415,000 GBP)⁷⁶. Shi Dati, Gu Daju (识大体, 顾大局)⁷⁷ is a slogan to encourage people to devote themselves to the collective good and sacrifice individual interests when two of them are in conflict with one another. I found it written on a road construction site in August 2015, where some houses had been demolished a couple of days before my visit. Along with the legitimizing mechanism of land transfer (see Sections 4.2 and 4.3),

⁷⁶ Like most of the urban road construction, the Landscape Avenue adopts the “Build-Transfer (BT)” model. With a BT agreement, the government can introduce foreign or private funds to carry out the infrastructure construction. After the completion, according to the agreement, the relevant rights of the project facilities are redeemed by the government, and the costs are repaid to the investor. Data retrieved from the official news report by the Zhaoping county, <http://www.zpol.cn/index.php?m=content&c=index&a=show&catid=35&id=20625>, 16th September, 2018.

⁷⁷ Shi Dati, Gu Daju (识大体, 顾大局) may be translated as “Recognize the general interest, and consider the overall situation”.

road construction is justified as in the public interest, since Landscape Avenue will not only improve the traffic flow in Huangyao, but will also enhance its image and ease its upgrading from 4A to 5A as a tourist site. For the government who take a leading role in local economic development, any projects related to tourism projects can be justified as in the public interest. This justification favours the implementation of such projects, regardless of the fact that the local government and the Tourism Company are the actual owners and regulators of the project. The construction of this Landscape Avenue benefits from its connection to the tourism project as a collective interest. Therefore, the avenue project could get abundant land resources without worrying about the interests of individual households whose houses and farmland might be demolished. In fact, like the owners of houses being demolished during the avenue construction, small-scale businessmen and the life of the local community are defined as free riders in the tourism project. Therefore, individuals enjoy less importance. This is how the hierarchical order between the tourism project and the local community is constructed. It works to justify the sacrificing of individual interests.



Figure 9. The construction site of Landscape Avenue. Some houses were forcibly demolished before the avenue construction could start. On the left side is a ruined house by the roadside. Unfortunately, I did not have a chance to meet the victims to discover why they had not agreed with the land acquisition for Landscape Avenue. According to other local residents, the disagreement was over the amount of compensation. However, I did not get the exact amount that had been offered. *Source:* Photo taken by the author in August 2015.

However, from the perspective of the local residents and individual business owners, their interest does not coincide with the so-called public interest. Seeking to reconcile the interpretation of the project leaders with that of the “free-riders”, in 2014, 5 local residents initiated the Huangyao Ancient Town Council for the Promotion of Economy and Culture (黄姚古镇经济文化促进会, Huangyao Guzhen Jingji Wenhua Cujin Hui, HATC for short) and it was recognised by the town government. The council was organized by local residents in order to set up a channel to lubricate the communication between the local community and the tourism project leaders. One of the achievements of the council was that the Tourism Company and the local government agreed to reserve part of the ticket

revenue⁷⁸ as an economic compensation for the local residents. Moreover, local residents could get cheaper tickets the tourist sites (90% of the original price) from the Tourism Company to sell to the tourists at full price.

However, in the case of Huangyao the economic compensation was merely a temporary compromise rather than an effective communication mechanism that could resolve the discrepancies between local government, the Tourism Company, and the local community. Taking a share of the ticket revenue does not solve the problems caused by a profit-making model based on admission tickets, not to mention that in 2014, only 80 yuan was returned as a bonus by each local resident⁷⁹. Tourists, who pay 100 RMB to enter this touristic town, always complain that they are asked for extra admission fees if they wanted to visit certain historical sites in it. They assume that all the historical sites should be covered by the same admission ticket. However, since local residents are not considered the real “owners” of this tourism project, and they hold only a very low proportion of the ticket revenue, such historical sites are not perceived as something included in the 100 RMB ticket. Considering themselves the real owners of the Ancient Town, they justify the extra ticket fee as a fee to enter their own property. In fact, some local residents are still living in the houses. There is a building called “Sima Mansion (司马第, Simadi)”, which is identified as one of the main historical sites⁸⁰ in which the local residents are still in situ. A signpost pointing to a scenic spot stands in front of the building, which indicates that the building itself is somehow a place to visit. However, as a space mainly for private use, Sima Mansion is not regularly open to the public. I was lucky to have a chance to enter the building as a tourist, since the house owner was at home – but not many other tourists were there at the time. There was not much to see in the building, since there was a dark corridor behind the main hall, acting as the border between the touristic elements and family use.

⁷⁸ To enter the Huangyao Ancient Town, tourists need to buy a ticket from the Huangyao Ancient Town Cultural Tourism Ltd. According to the agreement of the partnership, 85% of the gate receipts stays in the company or goes to its parent company, which at the time was Guangxi Gui Neng Electric Power, and the other 15% goes to the county government (see the research of Xu, 2011).

⁷⁹ It is said by local residents that in 2014 they got no more than 80 RMB from the Tourism Company (not including the benefits they got from selling discounted tickets).

⁸⁰ According to the protection plan (Guangxi Urban-Rural Planning Design Institute, 2008a, p. 51), this building is identified as a core touristic sight.



Figure 10. Pictures of Sima Mansion. The poster on the left is at the main entrance of the building, with a photo of the exterior in the top left-hand corner. The picture on the right is the family memorial tablet in the main hall of Sima Mansion. *Source:* Photo taken by the author in August 2015.

Apparently, paying economic compensation to the local residents was meant to make them feel part of the tourism development model led by the local state, but it worked ineffectively. From the standpoint of the local residents, there should have been better ways for them to engage in tourism development and a better return for doing so. But all other possibilities are restricted by the state-led model. Therefore, the development of the entire ancient town by the Tourism Company and the local government without the committed participation of the local community has not been accepted by the local residents. As a result, the economic compensation could make up for only a small proportion of the losses caused by the tourism development of the town, and could not have been helpful for further negotiation and ending further conflicts among the parties.

Furthermore, some people even rejected economic compensation, because if economic compensation were normalized, the local community would have no chance at all of rejecting tourism development (Shin and Zhao, 2018), but only the choice of accepting or rejecting compensation (Ong, 2014). From the perspective of the local residents, their normal way of life had been disturbed by the onset of tourism. Local residents complained that even they had to prove that they were residents of the town because the ticket inspector could not distinguish the local residents from the tourists. Moreover, according to the villagers, Huangyao Central Elementary School, an elementary school partially funded and constructed by local residents, was relocated because of the arrival of the

Tourism Company. Although the villagers tried every possible way of stopping its relocation, the school was lost. Similar things happened to a small piece of land – called “the peninsula” – on the east bank of the Yao river in the core touristic zone of the ancient town, which had been abandoned a long time before the tourism project was launched. The Tourism Company wanted to build a hotel on this piece of land. Although it went through the official land acquisition process (see Section 4.3), the local residents did not accept the decision. They preferred to reframe the story of the peninsula as “forced sell and buy”⁸¹, and not as a legal land transfer.

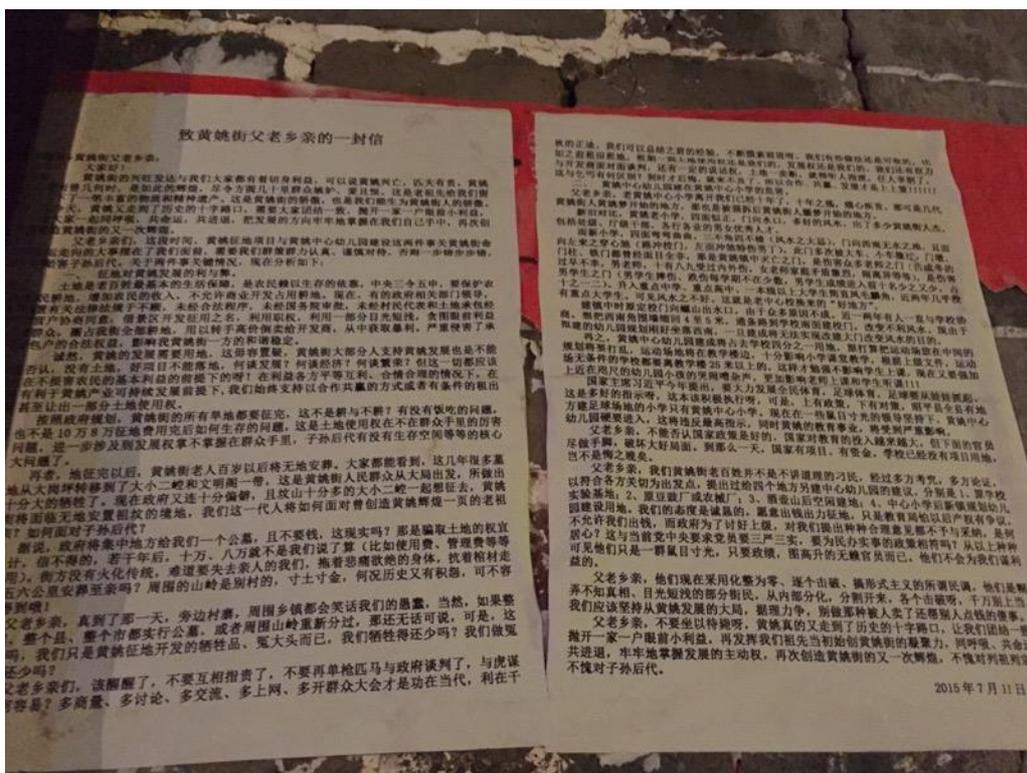


Figure 11. “A Letter to the Folk of Huangyao Street” posted on the wall in the Ancient Town. *Note:* The letter listed the losses caused by tourism development in Huangyao. In particular, land acquisition has destroyed the livelihoods and culture of the local community; moreover, the local authorities have ignored the suggestions of local residents in the construction of kindergarten and a primary school. It aimed to call on local residents to unite and fight for the right to speak in the further development of Huangyao. *Source:* Photo taken by the author in August 2015.

As a result of the unfailingly state-led model of development, the dispute over Huangyao’s tourism project reached breaking point. Two weeks after I finished my first fieldwork in Huangyao, a few dozen people protested on September 12th 2015, objecting

⁸¹ The villagers did not agree with the land price of 60,000RMB pre mu (亩, 1 mu = 666 m²).

to the forced land acquisition planned by the local government on September 20th 2015. The core members of the Huangyao Street Committee were arrested directly after the protest⁸². In order to launch further appeals and support the arrested people, Huanyao then launched a merchants' strike. All the shops and guesthouses decided to close for three days, and the streets were covered with rubbish. The protests and strike put pressure on the local government to make a decisions. However, very quickly, with the arrival of National Day Golden Week⁸³, everything went back to normal. By the end of 2015, the local office of Zhaoping County government, Huangyao Ancient Town Scenic Area Administration, had been replaced by the local office of the Hezhou Prefectural City government, named the Guangxi Huangyao Ancient Town Tourism Culture Industry Area Management Committee (see Section 5.3).



Figure 12. Pictures of the merchants' strike in Huangyao and the streets covered in rubbish. *Source:* Photo was taken by an informant in September 2015.

⁸² According to local informants (without any official announcement from the government), 24 people were arrested in the name of “gathering people together and disrupting public order (聚众扰乱公共治安罪, Juzhong Raoluan Gonggong Zhian Zui)” between 11th -14th September, including villagers, the street spokesman and the clan leader.

⁸³ The first week of October is the National Day Golden Week, which for all tourist sights in China is one of the busiest times of the year.

All the time the state-led tourism project was expanding, the local community was becoming marginalized. It is now believed that, from the time the Huangyao tourism project was designed, it was defined as a project operating on the official level (see Sections 4.2 and 4.3). Although this tourism project is defined as a public project with a collective interest, such as poverty alleviation, it is still undefined what the collective interest consists of and who the agents are of such interest. The joint development model which combines local government with external capital, consequently excludes the participation of local residents in the development process. Since there has been no possible channel to facilitate the power dynamic between the dominant group and the peripheral, such a project must result in absolute domination, and conversely with absolute resistance. It raises the question of how far the tourism project is still a public project in which everyone in the town is treated as a relevant stakeholder, or, in fact, how far it is a project that transforms everyone in the town, as well as the leaders, into potential competitors with everyone else. In other words, by following the existing development model, the project leaders and the local community are excluded one another and position themselves as antagonists.

Such a relationship is particularly evident when it is expressed spatially. More and more businesses are set up in the new town on the north side of the Ancient Town, including a big hotel owned by the local government. While the space of the New Town of Huangyao dominated by the local state is experiencing rapid development according to the official plan, within the area of the Ancient Town, any construction work which needs collaboration between the local community and the local state, such as the upgrading of the power grid, is seriously delayed because of the above antagonism. As time and electricity are lost, a location in the ancient town loses its superiority, and becomes a burden. By contextualizing the upgrading of electricity (see Chapter 5) from the perspective of the urbanisation mechanism of Huangyao, we can clearly identify the power dynamic which is mediated by the power grid.

4.5. Summary

This chapter focuses on the link between state-led territorial urbanization and the rising rural tourist economy in which the infrastructure construction is contextualized. The historical site, Huangyao Ancient Town, which experienced its rise and fall long ago in history, has recently been reactivated and is heavily relied on for the town's fast

development of tourism activities. Riding from the “Beautiful Villages”, “Characteristic Towns”, and rising eco-tourism, the ancient town as well as the natural landscape of the town’s surroundings, is reframed as a symbol of nature and dreamland, through which the space of Huangyao is ready to be transformed into a set of valuable resources for the tourist economy. In the meantime, in order to mobilize the tourism economy in the impoverished town, economic concerns, such as “poverty alleviation” and “the rise of green”, are used to legitimise the strategy of this kind of state-led tourism project.

Without other forms of economic support, the tourism project becomes the only strategic way of realizing the promising vision of alleviating poverty by economic development. A new town of Huangyao is technically and systematically planned outside the Ancient Town, in a way which will transform the agricultural land into construction land and then the population will be relocated to the new town area in order to support the scale of the expansion of the construction land. Throughout the whole process, the local government, here, the county and prefectural city authorities, has a critical influence on the planning process and legitimizing the regulation of land transformations and transactions. Paving the way for tourism real estate, a landscape protective scheme dwindles by compromise into a scheme with more residential and commercial land. Under such concrete mechanisms, the tourism project of Huangyao is gradually transformed into a process of land-based accumulation and speculation.

The same logic is adopted within the area of the Ancient Town. The only difference – that the old buildings and streets must not be demolished or relocated – is because they, together with the local residents, are objectified as the key resources of the tourism project which must be preserved. Therefore, within the area of the Ancient Town, the situation is more nuanced. Besides the absolute domination of the local state and the developer, there is the strong resistance of the local community. However, the resistance has gone no further than topics, including proper compensation for land acquisition, or property disputes between the local individuals and the Tourism Company which charges the admission fee to the Ancient Town. As a result, the tourism development transforms every entity in the town into a potential competitor with every other entity, with the project leaders and the local community equally excluded.

At this point, we may see how the town of Huangyao has been changed by the gold-mine of the tourism industry initiated by the local state, and how this concept has been implemented and reinforced through the land-based accumulation process. Although it

would be unfair to claim that Huangyao had been entirely changed from a living community into a project aimed at attracting further investors who could establish relevantly oriented industries, the basis for its new character has been land disputes. They steer many aspects of the re-construction of Huangyao town, including its rapid development of tourist facilities, as well as the mutual exclusiveness of the leaders and the group of marginalised citizens. The confrontation between these groups could be seen from the rubbish left on the streets during the strike, which shows the resistance and frustration of those who could find no way to participate in the decision making process.

At the same time, differently but still compatibly, a quieter form of participation by the infrastructure has accompanied that of the people; this resistance cannot be detected when infrastructural systems function normally. People tend to ignore the existence of infrastructure; they assume that it is functioning normally as a result of the cooperation between the social and the technical (see section 2.2). But in the case of Huangyao the condition of the electrical infrastructure reflects the politico-economic changes of this town in a physical form, which may be experienced by everyone who lives there and is linked by the same infrastructure.

As I mentioned at the end of the last section, while some buildings in the Ancient Town have a dedicated power supply, others have suffered increasing power shortages as the tourism industry has grown. This unevenness in the distribution of the electric supply is plainly visible in the town of Huangyao, and deepens the split between the privileged and the underprivileged (Swyngedouw, 1993, p. 323) through the geographical disposition of infrastructure. The dedicated power supply gives its users the privilege of dominating the rest of the citizens by controlling the resource of electricity. Through this process, the infrastructure then becomes one of the “arenas in which the struggle for control and power is fought” (ibid., p. 324). The problematic infrastructure should not be understood merely as a technical problem, but more importantly, as a project embedded with the dynamic and political nature of power.

Moreover, our discussion about sharing infrastructure should not end by viewing the infrastructure only as an extension or physical representation of property relationships. What makes infrastructure the unique entry point of this research is that it can articulate and alter the situation from which it originates. The mutual exclusiveness between the local government and the local community leads to the creation of public projects without public discussion or collaboration; the two sides have only a platform from which to

compete with and confront one another. If we view the strike as a one-off demonstration of resistance, then the problematic infrastructure must be understood as a never-ending negotiation in everyday life. Since the electric wires have to run through every house, the infrastructure needs the cooperation of all stakeholders whatever their socio-economic status (see Chapter 6 for further discussion). The mutual exclusiveness between the local governments and the local community has seriously delayed the upgrading of the electric infrastructure. Every time the infrastructure breaks down, it demonstrates the break-down of public discussion in this town, and reminds users that this kind of problem is perpetual.

In the next chapter, I focus on every aspect and activity of life that leads to the failure of the electric infrastructure. I examine the politics embedded in the electricity wires as they lead from individual users to the local state, from human actors to non-human participants. The discussion will answer the question of what it is that upgrades the negotiation of the electricity infrastructure to an everlasting process.

Chapter 5 Upgrading the Electricity and Upscaling the Tourism Project

5.1. Introduction

In the last chapter, the Huangyao tourism project was contextualised in the Chinese model of territorial urbanisation. Through tourism development, Huangyao's land centred urbanisation upscaled the technological discussion of the electricity infrastructure to a question of political economy. Inspired by claims from studies in science and technology, the problem of electricity deficiency brought an agenda which "indeed both technology and society" were part of (Bijker and Pinch, 2012, p. xviii). Therefore, to understand the problem of upgrading the electricity, we should not take the essentialist view, which treats the construction of electricity infrastructure as a mere technical issue that can be left to the wisdom and effort of designers and engineers. Instead, this chapter focuses through discussion on all the activities that led to the failure to construct an electricity infrastructure, including the relevant human and non-human agents, as well as technical and institutional issues. Taking a constructive approach, we see how the problems of technology are interlinked with the problems in the social sphere. To put it more appropriately, since the societal and technical problems are not external to each other, the problem of the electricity infrastructure is never a single problem of either technology or public management. In this chapter, the argument will not be restricted to infrastructure failure in touristic towns such as Huangyao, but also reveal that the infrastructure failure has resulted from the inevitable non-consensus of the actors involved, under the state-led and land-centred tourism development model.

Taking the case of Huangyao as our example, in the following discussion we highlight three key factors contributing to the un-upgradable electricity. They are, first, the upscaling effect of the tourism project on the electricity delivery; second, the institutional change in the power industry; and third, the endless disputes in practice surrounding the

delivery of electricity. Together with other similar projects in eco-tourism and leisure-tourism in Hezhou, tourism in Huangyao is articulated as an important means of achieving the territorial sovereignty of the local state through the *Big Health Industry*⁸⁴. As a result, the regulation of Huangyao has been elevated to the prefectural city level and its decision making has relied on abstract planning and calculation. As one of the main resources to support both the tourism project and everyday life in the ancient town, the electricity infrastructure is at an intersection formed by the local residents, the individual business owners, the tourism project leader and the project implementers. The electricity delivery through people's everyday encounters with a public utility encapsulates the upscaling of the local community's poor adaptation to the effects of the tourism project. The effect has been that the new electricity cable, situated where the agents involved have endless disputes in practice, then becomes in the upgrading itself a non-communicable idea to each party.

It could be seen that unlike the newly-arrived business owners, who are conscious and vociferous about electricity deficiencies, the local residents are quite accustomed to the unstable electricity supply, which is embedded in other social institutions of everyday life. This prompted me to investigate the institutional transformation of the rural electricity (农电, *nongdian*) system from the time when it was launched until the reform in 1998. Using a conceptual tool from substantivism (Polanyi, 1957), it was discovered that electricity was not to be identified only as a formal commodity with money as the central mediator which disembedded it from non-infrastructure institutions. According to historical research on the introduction and operation of electricity in the rural areas, the generating, transmission and consumption of electricity was a unified procedure. This suggests that a substantive electricity infrastructure was once dominant. After the power industry reform in 1998, the electricity infrastructure gradually changed to a formal commodity. This double aspect of electricity is one significant reason for the lack of consensus when it was conventionally communicated at the time of the upgrade and also provides the possibility of developing a way of communication that is not conventional.

⁸⁴ Based on ecological resources in Hezhou, the *Big Health Industry* (大健康产业, *Dajiankang Chanye*) refers to the industrial clusters promoted by Hezhou Prefectural city government, including "ecological health", "ecological tourism", "ecological leisure" and "ecological old age". For more detailed information, see footnote 101.

Before discussing the electricity upgrade in practice, we should examine how electricity was introduced in this area and how the social groups that it served got on with it. As shown in section 5.2, the rural electricity system which was set up in the 1950s in the massive rural expanses of China is still having an impact on electricity users nowadays. The routine operations before the arrival of the tourism industry, including the investment structure for construction, the management structure and the everyday ways of using electricity, serve to illustrate a sort of handbook of the electricity provision before upgrade. Being accustomed to the unstable rural electricity condition and its corresponding regulation, the users signalled that the generation and transmission of power is fully integrated with its everyday use. Electricity is then framed more by its use value, which is embedded close to other social values.

With the arrival of the state-led tourism project and its upscaling effect, the embedded electricity system seemed to be out of joint. Section 5.3 outlines the limitations of the old electricity system under the new conditions that the upscaled tourism project demanded. The reform of the rural power industry in 1998 has much to do with the condition of the electricity infrastructure in Huangyao nowadays. Unlike the rural electricity system, when the use value of electricity was over-riding, after the reform, the central concern became the exchange value of the electricity, while its use value retired to the background. Although the electricity cable has not been upgraded, institutional change has already arrived. Since they are paying electricity bills with a liberal understanding of the infrastructure service, business owners cannot tolerate the unstable and insufficient electricity provision. In general, the users have a different perception of the electricity infrastructure, for example, the business owners and the local residents.

Based on the historical discussion of the electricity condition in the area of Huangyao in sections 5.2 and 5.3, section 5.4 analysed the operation in practice of the non-communicable power infrastructure upgrade. This research presents the different attitudes in different social groups to the electricity upgrade, including the villagers, individual business owners, the administration office of the local state and the investors, constructors and the vendors of the electricity. They show that the electricity upgrade has meant different things and has a different importance for different groups. Therefore, predictably, the story of electricity has led to endless disputes, suggesting indeed that it would be impossible to persuade any participants to compromise and change their stance. If so, it suggests that there is no way out but to live with the sub-standard conditions. At the same

time, as becomes discernible in Chapter 6, there may be a new way of altering conditions slightly through electricity itself.

This chapter draws on historical records and studies of the electricity development, both at the national level and the local level of the Guangxi Zhuang Autonomous Region, the planning guidance and specifications published by the planning institutes, the official documents of the Huangyao ancient town project from the local party committees and the local governments (Hezhou Prefectural City Government and Zhaoping County Government). I also use some secondary resources extracted from the central and local news reports on the construction work of Huangyao.

5.2. The Routine Operations of the Rural Electricity Delivery

Electricity was introduced to China in the 1890s⁸⁵ (Li, 1983, p. 7), mostly in the form of the electric light, which was introduced to the public as illumination. It was not until the 1930s that electrical energy in China was widely used in industrial production (ibid)⁸⁶. Even in the early days, the electricity system was far more complicated than was generally thought. Perhaps the most common understanding of electricity is that it is one of the most efficient forms of energy that can be harnessed from natural resources and in terms of its distribution. This, a “public utility” seems to be the most widely accepted nature of such a resource. However, this understanding of electricity is not something inherent to it.

Other than understanding electricity as an energy resource, Nye’s research (1992) shows that other conceptions and definitions of electricity competed to show how electricity ought to be perceived when it was first introduced to American society. For example, it

⁸⁵ The first enterprise of national capital to produce electricity was the “Guangzhou Power Station” in the 1890s, operated by an overseas Chinese businessman, Bingchang Huang and approved by the Viceroy of Liangguang, Zhidong Zhang.

⁸⁶ Historical records extracted from Daigeng Li’s *The history of the Chinese electricity Industry, from 1879-1949* (《中国电力工业发展史料-解放前的七十年, 1879-1949》): “In the early stage of production and application of electrical energy, the electric power was mainly used for lighting. During that time, enterprises that produced electric energy were generally called electric light factories; later, they were called electric appliance company. Until the 1930s, these enterprises were successively called power companies. As what the naming of such companies suggests, electricity was widely used as the driving force for the industry not until the 1930s.”

was defined as “a tool for social improvement, which specifically speaking, is an enlivening ‘juice’ that could rejuvenate the nervous system and free mankind from toil” (ibid., p. 183). However, the definition given by the public sector did not have much impact. Since the American political system was decentralized, “a national energy policy was nearly impossible” (ibid., p. 182). Consequently, the businessmen and financiers beat the public sector and won the competition. In America, businessmen institutionalized electrification as a commodity during the formative years of the power industry. The industry grew fast under private ownership. Later, the technological constraints were gradually overcome by such improvements as alternating current and long-range transmission and private electrical companies on a small scale began to integrate regional systems. These “regionally integrated systems offered both economies of scale in power generation and a more efficient distribution of current” (ibid.). This reduced the chance for the public sector to play a role in the power industry, except for “[regulating] the interlocking network of holding companies, utilities and equipment suppliers” (ibid., p. 183).

Ney’s research shows the institutional and organisation form of technology production may have had an impact on the public perception of this particular technology as well as its dissemination. Below, I look at the history of the electrification of the rural areas of China, focusing on the way in which electricity as a resource was first introduced to the Chinese countryside, how the power industry was organized and developed and how electricity fused with everyday life. By reviewing the historical record, this section explores the basis upon which the electricity upgrade and the tourism project were set up in Huangyao. Founded in the 1950s, the rural electricity system had its distinctive characters in terms of meaning, material features and methods of organisation, etc. It reveals the substantial characteristics of electricity as a commodity.

Electrifying Rural China and Forming the Rural Electricity System

The early stages of power construction in rural China were heavily influenced by the Soviet Union. Shortly after the establishment of the Soviet Union, Lenin proposed a plan for electrification throughout Russia. Inspired by the famous slogan “Soviet regime plus national electrification is communism”, China’s rural electricity construction was closely linked with the ideal of “towards communism” (Zhang, 1994, p. 388). Following the Soviet Union’s initiation of an infrastructure for transmitting electricity, in the 1950s,

after three years of economic recovery following the founding of the People's Republic of China, the country's rural electrification began. Furthermore, in terms of urban-rural relationship, the development of the rural electrification had great significance in eliminating the urban-rural division. Especially in contrast to the power industry in the development of a capitalist society, rural electrification had a profound and unique mission in the construction of a new socialist countryside in China.

“In the development of the capitalist society, the economy and culture are concentrated in large cities and the population also gathers in large cities. This has deepened the abnormal development of the urban-rural antithesis and the worker-peasant antithesis in the whole society. China's rural areas must follow their own path of development and build up a new socialist countryside with Chinese characteristics. This is to develop industrial, commercial, transportation and cultural education in the rural areas, to digest agricultural surplus labour within the countryside, to stabilize the rural population in the rural areas and to build the rural area into a modern place where workers and peasants, towns and countryside are integrated, through the development of various forms of production and cultural undertakings in the rural area” (Zhang, 1994, p. 387).

To this end and influenced by Engels' words that “electrification becomes the most powerful of levers in eliminating” the urban-rural division (Marx and Engels, 2010, p. 449)⁸⁷, rural electrification was officially launched.

Rural electrification had two different routes, deeply influenced by China's geography. In the plains and hills areas, rural electrification was mainly based on the extension of the national grid; elsewhere it was based on small hydropower stations and small thermal power stations within local range. Guangxi has an undulating landform and rich hydraulic resources. It was a typical area in the development of rural electricity. The work unit which was responsible for the latter route of the electricity system was known as the rural

⁸⁷ See the Letter from Friedrich Engels to Eduard Bernstein, March 1st 1883, English translation from Marx & Engels Collected Works, Vol 46, Letters 1880-83, p.449. “And Deprez's latest discovery, namely that electric currents of very high voltage can, with a comparatively small loss of energy, be conveyed by simple telegraph wire over hitherto undreamed of distances and be harnessed at the place of destination – the thing is still in embryo – this discovery frees industry for good from virtually all local limitations, makes possible the harnessing of even the most remote hydraulic power and, though it may benefit the towns at the outset, will in the end inevitably prove the most powerful of levers in eliminating the antithesis between town and country.”

electricity unit. In such areas, the electricity consumption is mostly for agricultural production and a small amount of industrial production. The proportion of household electricity consumption is pretty low⁸⁸. Therefore, when a service industry entered the countryside, too little electricity was provided. The specialized rural power units were widely different from the urban power system in terms of their hardwired construction and organisational structure. They had a very strong local base in terms of investment and construction and a unified management of the generation, transmission and consumption of electricity.

In order to achieve rural electrification, developers were encouraged to rely on local people's participation⁸⁹ and to take advantage of the local energy resources to develop small power stations. Especially in the mountainous and hilly areas which the urban grid found hard to reach, they were encouraged to construct small hydropower stations to support rural electricity consumption. In the 1970s, local hydropower experienced a significant transition, when the development of small hydropower stations was followed the principle of "using self-generated electricity" (自己办电自己用, *Ziji Bandian Ziji Yong*) and "letting the income from electricity support electricity expenditure" (以电养电, *Yi Dian Yang Dian*)⁹⁰. In effect, the income from a small hydropower station would not be calculated as local fiscal revenue. The electricity sector achieved a certain degree of self-regulation. These conditions favoured the construction of a number of local

⁸⁸ In 1985, rural electricity consumption was 57.332 billion kwh, accounting for 16.46% of the country's total electricity consumption. Most of the rural electricity consumption was concentrated in the processes of irrigation, drainage, agricultural production and townships' industrial use. Only 24% of rural electricity consumption was household electricity consumption. In Western countries, the household electricity consumption was currently 80%. Data extracted from *The Electric Industry in Contemporary China* (Zhang, 1994, pp. 371–391).

⁸⁹ Concerning the overall situation in China, nearly half of the funds for construction depended on local finance and self-raised funds. Data extracted from *Dangdai Zhongguo De Dianli Gongye*, (Zhang, 1994, p. 384).

⁹⁰ In 1969, the Ministry of Water Resources and Electric Power held a national small hydropower site meeting in Yongchun County, Fujian Province. After the meeting, a supportive policy, highlighting "who builds, who manages and belongs to whom", for small hydropower stations was formulated. The plan was aimed to implement a combination of constructions for water management and electricity transmission; "a single power station with 500 kW or less could receive 150yuan/kW subsidy from the state ... self-construction and self-management are emphasized and the benefits from electricity construction and management for all levels are protected". Data extracted from *Guangxi Zhuangzu Zizhiqu Dianli Gongyezhi 1909-1989* (Wang, 1992, p. 238).

hydropower stations⁹¹. In the 1970s, every county in the Wuzhou District (later becoming the Hezhou area in 2002), where the Huangyao Ancient Town is located, had a hydropower station of its own and formulated its own small power grid at the county level. In this way, each county founded its own power supply company (bureau), managed as a county enterprise⁹².

In order to adapt to the regional characteristics of the rural electricity, the management system of the rural electricity was first founded at the township level. Under the leadership of the township governments, an independent management station of agricultural power was established, which performed as a collective economy. The station's aim was mainly focused on managing the low-voltage lines and the electrical equipment in rural areas and managing the rural power distribution and regulation, and taking care of the operation of electrical equipment and the electrical safety.

Substantial Nature of Electricity under Rural Electricity System

The work of David E. Nye (1992) examines the process of electrifying America during the formative period of electrification from the general public's point of view. He shifts the reader's attention to ordinary people, including consumers, workers, reformers and housewives. In this section, after reviewing the historical changes of the rural electrification from the aspect of construction, I want to put the human experience of making electricity part of everyday life at the centre of the discussion.

In order to avoid the overloading of electricity during the day time, which would cause tripping and avoid the unstable operation of generator sets caused by the low loads at night or at weekends, every city in China since 1954 started the "planned consumption of electric power" (计划用电, *Jihua Yongdian*) according to the condition of the electricity

⁹¹ In 1978, the Ministry of Water Resources and Electric Power, together with the Ministry of Finance, jointly formulated a policy to support the development of local small hydropower stations. The policy emphasises that "For county level small hydropower stations, single stations with a total installed capacity of 12,000 kW and single-unit capacity below 6kW, their revenues would be counted as extra-budgetary income, which will not be included in the local finance" (Wang, 1992, p. 239).

⁹² The Wuzhou District Electric Power Company, which is responsible for the power supply of counties in the Wuzhou District area, including the Zhaoping County where the Huangyao Ancient Town is located, was established in 1974, directed by the Wuzhou District Hydropower Bureau. Data extracted from *Guangxi Zhuangzu Zizhiqu Dianli Gongyezhi 1909-1989* (Wang, 1992, p. 238).

supply (Bianweihui, 2004, pp. 409–415). The planned consumption of electricity is an administrative way of managing the distribution of electricity. Its most important feature is its use of administrative methods to regulate and adjust the contradiction between the generating and the consumption of electricity as much as possible. Under this system, the household electricity consumption and the production electricity consumption must be considered as separate but in close cooperation with each other⁹³. Factories should apply for an electricity use plan in accordance with their production plan and, meanwhile, the power plant would then arrange a corresponding time for each factory to be supplied with electricity ⁹⁴.

In terms of its management, since the 1970s, the Three Power Office (三电办, *San Dian Ban*), which refers to the safe, economic and planned consumption of electric power, had been gradually promoted in all regions of the Guangxi Zhuang Autonomous Region. In the 1980s, this Office was headed by the same level economic committee and then became one of the government's main functional departments⁹⁵. However, the supply of electricity had not reached a point of balance between the actual supply and the demand. Especially during dry seasons, shortages of electricity were felt all the time. Therefore, unplanned blackouts or blackouts in turn occurred from time to time in different regions. The administrative means had a highly significant effect on electricity regulation. Economic regulation played its part too. For example, the use of more electricity than the

⁹³ Before 1998, there was a policy to restrict electricity exception for production. Within the coverage of the national power grid, the use of electricity by hotels, restaurants (including foreign-funded enterprises), stores and public institutions, was strictly planned according to a regularly released electricity quota. It stipulated that the use of electric heating was prohibited; air conditioning and hot and cold air fans should be strictly restricted. At the same time, the growth rate in the consumption of electricity by urban and rural residents was strictly controlled. Data extracted from *China Electric Power Industry Policy and Industry Development* (Liu, 2006, p. 121).

⁹⁴ Every province, autonomous region and municipal city had to comply with the plan, being settled on a monthly (or daily) basis. All regions and users who used electricity excessively had to repay the cost, otherwise the managing system had the right to forcibly brownout or black out such users. Data extracted from *China Electric Power Industry Policy and Industry Development* (Liu, 2006, p. 121).

⁹⁵ *Three Power Office* system worked as follows: *The Office* on the autonomous region compiled monthly electricity plans and issued them to the local municipal economic commissions. *The Bureau of Power Supply* listed the power supply indicators for the key factories, mines and cities in the autonomous region and put forward the requirements and precautions to avoid peak hour power use. *The Offices* in various cities had to strictly control the power use in accordance with the indicators. The indicators would then be broken down level by level to the enterprises and domestic power users responsible for them.

prescribed amount incurred additional fines. The fine depended on the amount of electricity used and the power supply condition at the time. In short, during the planned economy era, the electricity supply was far less than the demand. However, even though it was inconvenient for households and industrial production, the regulations were unchallengeable.

This planned electricity consumption had a prominent impact on power consumption structure and hence on industry. The general electricity consumption situation in rural China is dominated by agricultural production and consequently, the proportion of the household electricity use is relatively low⁹⁶. In the case of Huangyao, its use of electricity is in line with the overall situation of Guangxi. Huangyao's economy depends on agriculture. Besides the use of electricity for agricultural cultivation generally, some food processing workshops were scattered among the households in the Ancient Town. As a result, within the Ancient Town, the agricultural electricity consumption and domestic electricity consumption cooperated closely, with a visible connection through the same electricity cable. Household consumption of electricity at the time was too low to require independent treatment before the boost that the service industry needed. The electricity provision in Huangyao was not prepared for the tourism economy nor for its rapid expansion.

Research on the development of rural electricity suggests that all the aspects of electricity, including the construction, regulation, consumption and everyday operation of its delivery, are integrated and embedded with each other. If electricity is defined as a commodity, in the process from its production until its final consumption, the use value is always given precedence. In other words, the use value of electricity is not concealed by an abstract exchange value. Therefore, the activities requiring electricity must be integrated within the everyday life of local community and constricted by other non-electric institutions. In this sense, I would suggest that the embeddedness of rural electricity as well as the corresponding rural economy structure may convey an idea of electricity as a substantial commodity rather than a formal commodity. However, I am not necessarily suggesting the electricity is intrinsically substantial. It is the regime through which the electricity was constructed that makes gives it this characteristic. The arrival of the state-led tourism project, which dropped on the Ancient Town from nowhere,

⁹⁶ See footnote 88.

put the embedded electricity system out of joint. In the next section, I review the reform of the Chinese electricity industry and the corresponding reform of the rural electricity system, through which the formal characteristics of electricity commodity are revealed.

5.3. The Effect of Upscaling on the Electricity Upgrade

Hezhou City, a prefectural level city to which the Huangyao Ancient town belongs, is at a lower level economic development than other prefectural level cities in the east and north of Guangxi. In terms of its industrial structure, the primary sector occupies a relatively large proportion, while the secondary and service sectors are relatively weak. A structure of this kind is consistent with the rest of Zhaoping County and Huangyao Town (Shanghai Tongji Urban Planning & Design Institute, 2012a, p. 14). According to the Zhaoping County Bureau of Statistics on the financial income of the Huangyao Economic Zone in 2006-2007, its fiscal revenue per capita was less than 15% of the average for the county (ibid., p. 40). It is obvious that, for the government of both the town and the county, one of the most important motivations for launching the tourism project in Huangyao was to alleviate poverty (see Sections 4.2 and 4.3). Therefore, by the time the tourism project was launched, the economic structure of Huangyao had experienced a fundamental change from relying on the primary sector to relying on the service sector, where electricity is a far more important means of production.

In continuing the discussion of Chapter 4, this section focuses on the way in which electricity in the Huangyao region was planned to have an upgrade in accordance with the upscaling of the tourism project. The upscaling of the tourism project from a town level project to a prefectural city government-led project produced the institutional dynamics that led to the flourishing of tourism development. However, as discussed in the last section, the condition of the infrastructure was not ready for this change. Following the discussion from the last section, I also discuss later in this section how the electricity in the Huangyao region was transformed from a substantial commodity to a formal commodity. Behind the electricity upgrade of Huangyao, is a bigger picture of China's reform of the power industry, through which the previous rural electricity unit is set gradually to disappear.

Upscaling the Huangyao Tourism Project

In 1984 the Huangyao Commune split into Huangyao Town and Gongqiao Township. At the time, Huangyao Town included only six villages located around the Ancient Town of Huangyao, managed by the Huangyao Street Committee. In 2005, Huangyao Town and Gongqiao Township⁹⁷ merged into a new Huangyao Town, whose administrative offices were located in the centre of Gongqiao. In 2007, the actual ownership of the Ancient Town area started to become elastic, when the Ancient Town was listed in China's catalogue of Famous Historical and Cultural Towns (FHCT). From this point, local government at the county level started to have direct access to it in terms of administrative management and decision-making on its tourism development. The upscaling of the Huangyao tourism project was officially launched under the leadership of Zhaoping County Government (ZCG) and, in 2015, the leadership was turned over to Hezhou City Government (HCG).

According to the *Regulation on the Protection of Famous Historical and Cultural Cities, Towns and Villages*⁹⁸, Zhaoping County Government (ZCG) is the only agent qualified to report Huangyao as a Historical and Cultural Town, to apply for a listing of Huangyao in the catalogue and to organize the formulation of the protection plan for the Huangyao Ancient Town. Since no master plan had been made for the town of Huangyao by the time it joined the list of Famous Historical and Cultural Towns, ZCG also became responsible for draft a master plan for it. The regulations institutionalize and confirm the

⁹⁷ From 1958 to 1984, the entire area where the current Huangyao Town stands was named the Huangyao Qu (from 1958 to 1961, the Huangyao Commune). At the time, the center of the Commune, including all the administrative offices, was located in Gongqiao, which was the center of the Commune as a whole (see Section 4.2).

⁹⁸ See Article 9, 13 and 15 of the Regulation. "Article 9: To apply for being a famous historical and cultural town or village, the local people's government at the county level shall file an application..." "Article 13: After a famous historical and cultural town or village has been approved and announced, the local people's government at the county level shall organize the formulation of protection planning for the famous historical and cultural town or village. The formulation of protection planning shall be completed within one year after the famous historical and cultural city, town or village has been approved and announced." "Article 15: The protection planning for a famous historical and cultural city or town shall last as long as that of the overall planning for the city or town." Data extracted from *Regulation on the Protection of Famous Historical and Cultural Cities, Towns and Villages* (State Council of the People's Republic of China, 2008).

leading role of the local government during the process of protecting the historical town and developing its tourism further.

In the event, the leadership of the ZCG was implemented through the administrative regulation and economic development of the tourism project. To begin with, a local office of the ZCG was funded, named the Huangyao Ancient Town Scenic Area Administration (黄姚古镇风景名胜区管理局, Huangyao Guzhen Fengjing Mingshengqu Guanliju, SAA for short), which took over the right to regulate the area where the tourism project was located, from the hands of the town government and the local community the Hyangyao Street Committee⁹⁹. The SAA as part of the town government on the New Street, shared its working space with the town government. The head official of the SAA enjoyed the same administrative rank as the head official of the Huangyao town government and the Party Committee Secretary of Huangyao Town held the post of head of the SAA. In this way, Huangyao Ancient town and parts of surrounding area that were included in the tourism project, stood out from the rest of Huangyao Town and were regulated directly by the local government at the county level. In the meantime, in 1999, Zhaoping County Party Committee (ZCPC) and Zhaoping County Government ZCG founded Huangyao Tourism Development Ltd., the general manager of which was the chief of the County Tourism Bureau (see Section 4.2). In July 2003, the government-founded company transferred 85% of its shares to the Guangxi Guineng Electric Power and Huangyao Tourism Development Ltd., was renamed the Huangyao Ancient Town Cultural Tourism Ltd (Xu, 2011, p. 16). Two months later, in September, ZCG transferred all the development and management rights to Guangxi Guineng Electric Power, for the following 50 years (from 2003-2052). From then on, in fact, Guangxi Guineng Electric Power has become the actual developer of the tourism project in the name of Huangyao Ancient Town Cultural Tourism Ltd. (HCTL for short), with a 50-year ownership except that 15% of the revenue will be shared with Zhaoping County Government (ibid.). In the close collaboration between the upscaling and the capitalization of the tourism project, ZCG and the owner of the Tourism Company become the dominant force behind the tourism project. This marked the point where control over the project started trickling out

⁹⁹ The Huangyao Street Committee is a self-governance organisation of villagers under the Self-governance System of the Primary Society Layer.

of the hands of the local community, confirmed by the absence of public participation (see Section 4.4).

Faithful to the collaborative model founded by the Zhaoping County Government at outset, the Huangyao tourism project moved to a new stage by the year 2015, when the local state joined in at the prefectural level. One day when I was doing fieldwork in Huangyao in the summer of 2015, it was rumoured that Huangyao Ancient Town Scenic Area Administration (SAA) and Huangyao Ancient Town Cultural Tourism Ltd (HCTL) had broken up. This rumour was based on evidence that the staff of SAA, who had shared the working space and canteen used by HCTL had got their staff canteen of their own far away from the workplace. This rumour was soon confirmed in October 2015, two months after I finished my first fieldwork. SAA had been replaced by the *Guangxi Huangyao Ancient Town Tourism Culture Industry Area Management Committee* (Guangxi Huangyao Guzhen Lvyou Wenhua Chanyequ Guanli Weiyuanhui 广西黄姚古镇旅游文化产业区管理委员会, HTIMC for short). As a local office of Hezhou City Government, HTIMC is at the same administrative level as Zhaoping County Government. The official head of the HTIMC holds the rank of divisional head, which is the same as the official head of Zhaoping County Government. In terms of the administration system, the tourism project of Huangyao had been promoted once more. It is now directly led by the prefectural level authorities. In terms of the actual land and population resources, according to the HTIMC, after the establishment of this new office, the Huangyao project now manages an area of 358 square kilometres, with a population of 213,000¹⁰⁰. Besides Huangyao Town, four other towns and townships were included in the Industry Area. In fact, the value and the potential of the Huangyao project have never been underestimated. It recalls an interview given by one of the planners who was responsible for the master plan of this town. The planning contract was signed between the Shanghai Tongji Urban Planning and Design Institute and the People's Government of Huangyao Town, Zhaoping County. If the project had stayed at the town level, then the County Government should have appraised it. However, according to the interviewee, Hezhou Prefectural Government got in touch in the middle of the process and the final appraisal was held in the Department of Construction of Guangxi Zhuang Autonomous Region (at provincial

¹⁰⁰ Data come from the official website of the Management Committee, retrieved on April 17th 2018, from <http://www.hycyq.gov.cn/index.php/item-list-category-7390.html>

level). He himself had, in the course of his planning work, been surprised to see the great importance attached to the Huangyao project by governments at higher levels.

It is not hard to understand the upscaling of the Huangyao project if we bear in mind that the prefectural level city government needed to relocate the resources for further development. With the background of the Green Development proposed at the 18th CPC Central Committee meeting, emphasising the beauty of nature and the rural lifestyle (see Section 4.2), a place such as Hezhou had a great opportunity to transform its ecological resources for economic expansion. In 2016, the *Hezhou Guidelines of the strategic emerging sectors of the 13th FYP* pointed out that projects of ecological economy, such as the *Rise of Green Strategy* and the *Big Health Industry*, will form a prominent industrial sector leading the economic development of Hezhou in the next few years (Government, 2016, p. 45)¹⁰¹. Huangyao, as a Famous Historical and Cultural Town in China and one of the four characteristic tourism towns in Hezhou, was considered as a major development project in line with the goal of the plan. In the *Hezhou Government Work Report* in 2016, the Huangyao project was further refined as a series of sub-projects to support the *Rise of Green* strategy of Hezhou. These projects included making Huangyao a national 5A level scenic spot, constructing the *Water Street* in Huangyao, constructing the *Cultural Tourism Creative City of the Dream Huangyao* and ensuring that the number of visitors would increase by 14.8% and the total tourism revenue would increase by 21.6% (Hezhou City Government, 2016). Intervening in the Huangyao project was one important way to cooperate with the ambitious strategy of the Hezhou City Government. We see from this that the newly founded *Guangxi Huangyao Ancient Town Tourism Culture Industry Area Management Committee* (HTIMC) had access to more people and a wider area than the *Huangyao Ancient Town Scenic Area Administration* (SAA) had had.

Keeping in step with the administrative upscaling of Huangyao, the investment and development agent of the Huangyao Tourism Company underwent reorganization. In October 2015, Huangyao Ancient Town Cultural Tourism Ltd (HCTL), founded by the Guangxi Guineng Electric Power, was evaluated as a non-monetary asset by its parent

¹⁰¹ “Taking the advantages that Hezhou is the first longevity city in China, it will play a leading role in tourism development. [We should] accelerate the cultivation of the industrial clusters including the ‘ecological health’, ‘ecological tourism’, ‘ecological leisure’ and ‘ecological old age’”. Data extracted from *Hezhou Guideline of the strategic emerging sectors of the 13th FYP* (Government, 2016, p. 45).

company¹⁰², the Guangxi Guidong Electric Power Co., LTD and participated in the funding of a new company, the Guangxi Hezhou Tourism Industry Group Co., LTD (GHTIG for short). To support the *Rise of Green Strategy* and the *Big Health Industry Sector* proposed by Hezhou City Party Committee (HCPC) and Hezhou City Government (HCG), the GHTIG consists of 12 sub-companies making investments and managing the tourism industry in the area of Hezhou. It may be concluded so far, that, first, the regulation and operation of the tourism project were taken over by the local state at the prefectural city level; second, the tourism project of Huangyao was capitalized as an asset through the operation of its holding company, which then participated in the prefectural level programmes.

From the perspective of Huangyao town, as a result of the upscaling from a common town centre to an industrial area directed by the local state at the prefectural city level, the town is already standing out from the surrounding villages and townships which belong to the regulation of the Zhaoping County. On the one hand, since the policy and financial support from the prefectural and the county state arrives more directly than it used, the development of the town has progressed faster than ever. During an interview with local residents of Huangyao town, I learned that Huangyao was understood as “the son of the official wife” (大婆仔, Da Po Zai), which is a metaphor illustrating the close relationship between Huangyao and the higher-level governments. And on the other, the towns and townships are treated like the sons of concubines. It is inescapably clear that not only had the street village committee lost the right to make decisions for the town and even for the town government, but it has become harder and harder for people to participate in the regulation and operation of the town. The institutional dynamic of the upscaling effect of the Huangyao town has stayed invisible to the public only at the layer of capital operation. Institutional change becomes eminently visible when the upscaling of facilities to support the everyday needs of the growing tourism is required, such as the upgrade of the electricity infrastructure.

¹⁰² Information confirmed by the sticker posted by the Board of Directors of the Guangxi Guidong Electric Power Co., LTD on October 23rd 2015. The original title of this document is *Announcement by of the Guangxi Guidong Electric Power Co., LTD on the establishment of a new company by the holding subsidiary Guangxi Guineng Electric Power with the relevant assets of the Huangyao Scenic Area* (广西桂东电力股份有限公司关于控股子公司桂能电力以黄姚景区等相关资产作价出资参股设立新公司的公告).

Designing the Electricity Upgrade

As soon as the Huangyao Ancient Town was listed in the catalogue of China's Famous Historical and Cultural Towns (FHCT) in 2008, the Zhaoping County Government (ZCG) started work on a plan for its protection. Aimed at moving some of the residents to the periphery of the Ancient Town and keeping the population of the core area at 1,700 (Guangxi Urban-Rural Planning Design Institute, 2008a, p. 52), housing projects for local residents were planned in three phases. However, according to the investigation at the time, the population within the Ancient Town area was around 2,500 (ibid.), which is far more than the historical buildings could hold. It was quite common to see several households sharing one historical building, which consequently led to a low quality of life and the intensified ageing and damage of the historical buildings.

Moreover, the flourishing development of the tourism project has far exceeded the capacity of the ancient town. Neither of the regulating institutions, *Huangyao Ancient Town Scenic Area Administration* (SAA), nor *Guangxi Huangyao Ancient Town Tourism Culture Industry Area Management Committee* (HTIMC), has introduced effective regulations to stop the increase of individual businesses. In fact, in terms of the development of the tourism economy, new businesses are exactly what the local governments want. More and more businesses have been set up in the Ancient Town and, meanwhile, more and more tourists have come to visit. In the past, only local residents lived in the Ancient Town. Now, although some of the local residents have moved to the New Street, they lease their houses in the Ancient Town for refurbishment as guesthouses, bars and shops by the newly arriving individual business owners. As a result, the density of the population in this town is constantly growing faster. Such a situation can apparently be inferred from the condition of the electricity supply. The old guesthouses, for example, are transformed into 10-15 modern flats or guestrooms. As shown in **Figure 13** and **Figure 14**, below (pictures of the front gate and middle yard of the Relevant Boutique Guesthouse), although the appearance and the building structure of the old houses could not be changed because of planning restrictions, each room inside the houses is fully equipped with electric appliances, such as televisions, air-conditioners and electric radiators, which are treated as the bare essentials for touristically oriented business. As discussed in Section 5.2, the main electricity system in the Ancient Town was built under the rural electricity system in which household electricity consumption was minimal. Therefore, it could not adapt to the high volume of consumption by the tourists and their

needs. The old cabling works normally only when the demand for electricity is low. When the peak season of tourism comes, the power system of the Ancient Town is always overloaded and the entire ancient town area suffers serious power shortages. In most cases when the power system is still able to work, the voltage drops to an extremely low point and each household finds it unstable. High-power electrical appliances such as air conditioners can hardly work in such conditions and the low-power electric appliances, for example, electric lights keep flickering all the time in response to the fluctuating voltage. There are worse cases – but still common – when overloading burns out the main transformer. In such cases, the power system stops altogether and the entire ancient town experiences a blackout.



Figure 13. A photo of the front gate of the Relevant Boutique Guesthouse. The guesthouse is renovated from a traditional house. The appearance of its front gate shares a consistency with the traditional landscape of the Ancient Town. Source: photo credit by the owner of the Relevant, June, 2015.

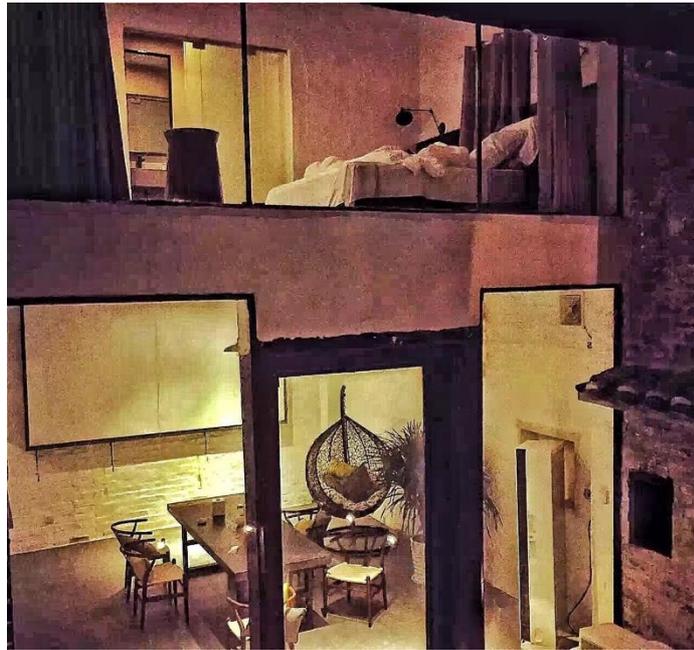


Figure 14. A photo of the middle yard of the Relevant Boutique Guesthouse. The ground floor is the hotel's common room, which was refurbished from the family's ancestral hall in the old house. On the first floor is one of the bedrooms, equipped with modern electric appliances and embellished with French windows. Source: photo credit by the owner of the Relevant, June, 2015.

The construction of the electricity infrastructure falls far behind most of the development of the tourism project in Huangyao. People who are living and doing business in Huangyao's Ancient Town have been putting up with these bad electricity conditions for many years and the negotiations to upgrade the electricity system with new cabling have continued for many years. From an engineering perspective, the power deficiency of the Huangyao Ancient Town can be diagnosed as the consequences of insufficient input and precarious transmission. First, Huangyao has never been connected to a power grid which can deliver sufficient and stable high-voltage electricity to Huangyao. Second, the transmission lines cannot withstand high electrical loads. This means that even though a high-voltage power grid is being connected with Huangyao, the households have no effective electricity supply. In order to solve the first problem, Huangyao has to connect with a higher voltage input and to set up a high voltage substation; for the second problem, the solution is to replace the existing electricity transmission wires with three-phase power and connect it to every household. From the following discussion of the electricity infrastructure as well as the plans for upgrading it, I want to explore the idea that what was delaying the upgrade is not simple engineering and technological difficulties. Instead, it is the institutional changes in the electricity industry, as well as the upscaling of the tourism project that led to this entangled situation. It supports the assumption at the

beginning of the chapter that the infrastructural problem is not an issue of technology. In other words, the infrastructural problem originated from within the socio-technical environment in which it is now embedded.

At the time the tourism project started, there was only one 35kV substation located in Gongqiao and two 35kV transmission lines connected Huangyao with the Xiping power plant and the nearby townships¹⁰³. Before this, the power system in the Huangyao Town had last been updated in 2002. It was from 2002, also, that all the villages in Huangyao got access to electric power. It is clear that the current precarious electricity condition cannot support further tourism development in the town. The future plan for upgrading shown by **Figure 15** calls for a substantial increase in the input power access and the output transmission lines have to be made. For the access to input power, the 35kV electrical substation will have to be retained in Gongqiao and at the same time, a 110kV electrical substation must be built to the west of the 35kV station in Gongqiao. Correspondingly, the transmission line within this area will adopt four-level voltage transmission (110kV, 35kV, 10kV and 380/220 V). These changes are designed to increase the capacity of the main transformer in the region. Therefore, during peak periods, it will be able to withstand much greater power loads. Before the upgrade plan, electricity consumption was supported only by one 35kV substation. After the construction of the 110kV substation, Huangyao will become the power hub for the surrounding five towns/townships. It can be seen from the changes to the figures and text in the plan that by bringing in the 110kV substation and transmission line, Huangyao will be directly connected to the Southern Grid and will break away from the rural power grid. The power supply of Huangyao area will be supported by both a 35kV and a 110kV substation.

The breaking away process of Huangyao electricity infrastructure goes step by step with the upscaling of the tourism project. According to the historical records, the power grid in the rural area of Guangxi was formed quite late (Bianweihui, 2004, pp. 354–362). By

¹⁰³ The Gong-Xi transmission line, which connects the Huangyao town with the Xiping Power station, was put into operation in 1987; the Gong-Zhang transmission line, which connects Huangyao town with the nearby Zhangmulin township, was brought into operation in 2002. There are also five 10kV transmission lines that connect Huangyao with nearby townships and small power stations. Data extracted from *Master Plan of Huangyao Town Zhaoping County (2010-2030), Text and Drawings* (Shanghai Tongji Urban Planning & Design Institute, 2012b, p. 74).

the end of the 1960s, only some small-scale power grids had been built. Some places, indeed, had no access to electricity until the 21st century. However, the layout of most places covered by the power grid under the management of the rural power system lacked scientific design, which led to high loss in power transmission and an unreliable power supply. The upgrade of the rural power grid in Guangxi started gradually during the 1980s and 1990s. In 1998, the State Council officially proposed the rural power reform and one year later, it was proposed that the institutional reform of the rural power system should be finished within three years¹⁰⁴. Although the institutional reform of the rural power system was finished in the early 1990s, it did not immediately initiate the transformation of the actual electrical hardware. Instead, the upgrading of the hardware was completed little by little, along with various kinds of development of the rural areas. In the case of Huangyao, the rural power system upgrade coincided with the tourism project; otherwise, it is hard to explain how the small town of Huangyao could have been directly connected with the main powerline of the Southern Grid and become the electrical hub of the neighbourhood. The urbanisation of Huangyao, together with the upscaling effect driven by the touristic project, consequently launched the upgrade of its infrastructure system. In the same way, the upgrading of the electricity infrastructure in Huangyao reveals how the upgrading of the electricity infrastructure was triggered by the urbanisation of Huangyao, which originated in and was restricted by the upscaling effect of its tourism project. In other words, what determined the upgrading of Huangyao's infrastructure was not the volume of everyday consumption, but had much to do with the importance of the tourism project to the local state.

Figure 15. Planning map of the power project of Huangyao. *Source:* Master Plan of Huangyao Town, Zhaoping County (Shanghai Tongji Urban Planning & Design Institute, 2012b, p. 34). Notes: (1) The red line on the left side of the map is the 110kV transmission line and the red spot refers to the 110kV electrical substation. (2) The pink lines are the 35kV transmission line and the pink spot refers to the 35kV electrical substation which is in Gongqiao. (3) The orange lines are the 10kV transmission line. (4) The yellow spot refers to Huangyao Ancient Town.

¹⁰⁴ In October 1998, the General Office of the State Council forwarded the circular from the State Planning Commission (the predecessor of the current National Development and Reform Commission) named “two transformations and an equal price” (两改一同价, Liang Gai Yi Tong Jia). It aimed at transforming the rural power grid, reforming the rural power management system and adjusting the urban and rural power prices accordingly.

Figure 16. The situation of the electricity infrastructure of Huangyao before the upgrade. *Source:* Master Plan of Huangyao Town, Zhaoping County (Shanghai Tongji Urban Planning & Design Institute, 2012, p. 18). Notes: (1) The thick red line towards the bottom of the map is the 110kV transmission line. (2) The thick pink line is the 35kV transmission line and the pink spot refers to the 35kV electrical substation which is in Gongqiao. (3) The orange line is the 10kV transmission line. (4) The yellow spot refers to the Huangyao Ancient Town.

Another change due to the electricity upgrade is the redistribution of the 10kV medium-voltage transmission lines (the line shown above in orange) and the replacement of the low-voltage transmission lines. 10kV medium-voltage transmission lines connect the high-voltage lines with the household low-voltage transmission lines. By comparing **Figure 15** with **Figure 16** we see that the distribution of the 10kV medium-voltage transmission lines will be rationalised from their self-regulated origins to something better planned. **Figure 15** shows that 10kV medium-voltage transmission lines will be laid throughout Huangyao town. At the current stage of touristic development. Since most of the production and household electricity consumption of Huangyao will be concentrated within the area of the ancient town, in practice, the 10kV lines will first go through the New Street and the Gejiangshan Road, at the north and southwest of the Ancient Town. By the time I arrived for the second spell of fieldwork, the 10kV medium-voltage transmission lines had been set up.

After considering the construction of the 10kV medium-voltage transmission lines, our discussion moves to the low-voltage transmission lines. The construction of low-voltage transmission lines is closely related to the state of the voltage in each house. If we take a closer look at the conditions for electricity delivery within the Ancient Town, we see that the electricity delivery routes are typically depicted by **Figure 17**. The buildings within the Ancient Town cannot be linked directly to the 10kV medium-voltage lines. There is one more issue that to keep in mind. With the aesthetic concern to protect the Ancient Town landscape, wires should not be apparent in its main streets (Guangxi Urban-Rural

Planning Design Institute, 2008, p. 20)¹⁰⁵. Besides, in constructing actual wiring schemes, wires are not allowed to extend unsupported or to appear on a building's front façade. It is relatively easy to deal with these matters for the outermost houses of the Ancient Town, such as its northernmost houses. Since they are backed by the New Street, their electrical wiring can be directly connected to the 10kV electricity wiring on the New Street. In contrast, things are more complicated for the houses in the centre of the Ancient Town. Apart from anything else, designing the delivery route of the cable needs to take the flow of tourists into account. That is, the wiring must be routed from the "backstreets" (shown by **Figure 19**) where tourists seldom venture. If it has to be routed in some special cases from the main streets to the centre of the Ancient Town then it is necessary to dig up the quartzite and bury the electricity wires underground. The electricity delivery route drawn in **Figure 17** shows the household connection diagram on the south side of Tianran Street before the electricity upgrade. Tianran Street (shown in **Figure 18**) is one of the eight major streets within the Ancient Town. The houses on the north side of this street are backed by those of the New Street. Therefore, they could be directly connected to the main electricity line on the New Street. However, the shops and guesthouses on the south side of Tianran Street should be connected to the main line in the way shown in **Figure 17**. Before the electricity upgrade, the original cable was composed of three 12mm² diameter wires, one null line and two 220V voltage live wires¹⁰⁶. After the upgrade, the old cable will be replaced by four 36mm² diameter wires and one null line with three 380V voltage live wires.

¹⁰⁵ According to the *Protection Plan of Huangyao as the National Famous Historical and Cultural Town, Specification*, rather than crossing any of the streets, all the electricity wires should run underground (Guangxi Urban-Rural Planning Design Institute, 2008a, p. 41).

¹⁰⁶ The actual voltage of the live wires stays at 100V-110V because of the electricity deficiency.

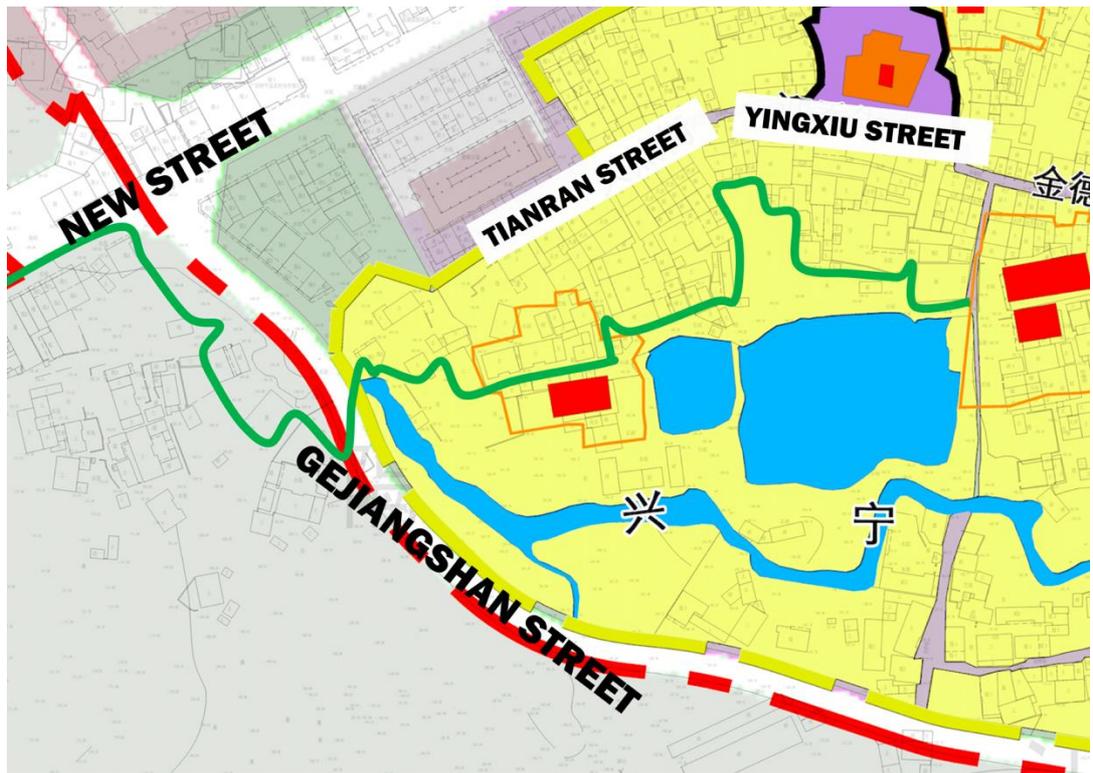


Figure 17. The map of the west part of the Huangyao Ancient Town, colored in yellow. *Source:* map credit by the Construction Control for protecting the Cultural Relic of the Master Plan of Huangyao Town, Zhaoping County (Shanghai Tongji Urban Planning & Design Institute, 2012, p. 29); the drawing of the electricity delivery route and the English labels are by the author. *Notes:* (1) The New Street and the Gejiangshan Street are labelled at the outskirts of the Ancient Town; Tianran Street and Yingxiu Street are labelled within the Ancient Town. (2) The green line refers to the low-voltage transmission wire which connects each household on Tianran Street and Yingxiu Street with the main electricity wire on the New Street.



Figure 18. A photo from Tianran Street where the Relevant Hotel stands. No electricity wiring like this should appear on a main street. *Source:* photo credit by the owner of the Relevant, July, 2015.



Figure 19. A photo from the back of Tianran Street. Electricity wires can be seen under the eaves and across the street. *Source:* photo credit by the author, July, 2017.

As discussed above, the upscaling of the tourism project of Huangyao turned the regulation over to the SAA, the local office of the county government (and later to the HTIMC, the local office of the prefectural city government). Accordingly, it relinquished the regulation of the local community and gave it to the local state at the county and prefectural levels. The SAA and the HTIMC are each in charge of everything related to the tourism project within their own territory. In the case of the upgrading of the electricity infrastructure, for example, this institution is responsible for estimating the advantages and disadvantages of building up a new electricity cabling system and providing a solution for maintaining the ancient appearance of this area. Working together with the SAA and the HTIMC are the professional planning institutes. The engineers at the Tongji Planning Institute, who were responsible for the municipal engineering planning of Huangyao, introduced a design for the upgrading. The power upgrade in Huangyao was based on the expected scale of the industry over this entire region, including the scale of the population and the scale of the economy in this area, according to which they calculated the electricity load required. From the perspective of the

professional planner and the project leaders, upgrading the electricity infrastructure seems to be a statistical and technical issue. However, this design in practice may have obstacles to overcome.

The Institutional Change of Electricity Delivery

In the sub-section above, I explained how the electricity upgrade in Huangyao was designed. In the following paragraphs, I want to describe how the design will be implemented. In terms of the construction, such works, including the laying of medium/low-voltage cables, maintaining electrical hardware and collecting electricity fees, are all the responsibility of the Town Administration of Power Supply (TAPS for short), which is one of the town level branches of the Zhaoping Water Resources & Electric Power Co., Ltd. (昭平县水利电业有限公司, ZWEC for short). The power supply institutions are outcomes of the reform of the Chinese power industry in 1998. Held at the end of 1995, the National Electricity Working Conference proposed a mode of major adjustment of the power system: the administration functions were transferred to the government's economic departments, as a whole; the corporate functions were transferred to the State Power Corporation of China (SPCC for short)¹⁰⁷; and the industrial functions were transferred to the Chinese Electricity Council (CEC for short). The reform aimed to extract the administrative functions of these state enterprises, which accordingly made each power enterprise a relatively independent economic entity. Consequently, from 1999, the functions of the Three Power Office (see Section 5.2), which was responsible for managing the distribution of electricity in the planning era, were cancelled and the Office was converted to an inspectorate of the electricity provision (S. Wu, 2010, p. 299).

The newly formed electricity enterprises then became “self-employed, self-financed socialist commodity producers and operators, with the ability to realize self-reform and self-develop” (Zhang, 1994, p. 243). On the one hand, profitability has become one major focus of these enterprises. In order to expand the sales of electricity, the former “planned

¹⁰⁷ Founded in 1997, the State Power Corporation of China was a state-owned enterprise, whose parent company was the State Council. In 2003, the SPCC was dismantled. Its successors were several state owned enterprises, including the State Grid Corporation of China, China Huaneng Group, China Huadian, China Datang Corporation, etc. Data extracted from *China Electric Power Industry Policy and Industry Development* (Liu, 2006, p. 118).

electricity consumption” (计划用电, *Jihua Yongdian*) has been replaced by “encouraged electricity consumption” (鼓励用电, *Guli Yongdian*). Better service was implemented to reduce the barriers to electricity consumption. For example, shared meters were gradually replaced by private meters. It aimed to solve the problem of high levels of communal electricity sharing, which then led to a positive effect on the private consumption of electricity. In the meantime, power enterprises began to pay attention to the recovery of electricity bills and also to secure profitability by avoiding any possibility of further arrears in electricity bills¹⁰⁸. Small-scale users, including individuals, collectively owned companies and contracted leasing companies are requested to pay a deposit on their electricity consumption; the users who had a bad record of arrears were required to install prepaid meters and controllers (S. Wu, 2010, pp. 317–318). Since then, the relationship between the power supply department and the users has become a relationship between sellers and buyers.

The reform of the power industry was not a simple technical change, for the implementation of technical devices and organisational reform have further social and political implications. Focusing on the journey of a single technical device – the prepaid meter – from Victorian liberalism to late-apartheid South Africa, von Schnitzler argues that although the devices were assembled and re-assembled differently according to different social and historical contexts, in both settings “specific ethical and political projects were delegated to technology and technology itself became a terrain on which such questions were expressed and negotiated” (von Schnitzler, 2013, p. 682).

We should look more closely at the way that a pre-paid meter works. Out of 19th century Victorian liberalism, the “penny-in-the-slot meter” made possible “the integration of the whole city within a networked grid”, on the one hand, and “divided its population into two sets”, on the other. Only people who could not be trusted to pay their bills regularly were connected to the electricity flow with a prepaid meter- (ibid., p. 677). Similarly, in South Africa, such prepaid meters became the technical solution to the crisis of non-payment of electricity bills. This device could automatically disconnect people who could

¹⁰⁸ In 1995, the National Ministry of Power Industry issued the “Notice on Conducting the Electricity Consumption Census” and then the Guangxi Power Industry Bureau carried out a large-scale census on the use of electricity, which with particular inspection for the violation of electricity use and the stealing of power energy. See the Guangxi Zhuangzu Zizhiqu Dianli Gongyezhi 1991-2002, Wu, 2010, p. 310.

not pay for energy from the city's electricity flow and, at the same time, the electricity grid could spread wider with the technical support of such meters. The case in Britain and South Africa shows that someone who cannot pay the bill may immediately lose their connection to the electricity infrastructure. There was to be no room for poor people to negotiate with a prepaid meter installed. In this way, electricity has become a commodity that can be measured only by money. Getting rid of its poor subscribers gives electricity companies more ability to expand the grid. However, the expansion of the grid does not necessarily mean the expansion of access to electricity.

This study led me to rethink the reform of the China power industry and its impact on the user-provider relationship. The private meters, pre-paid deposits and the accountability oriented organisational change magnify the exchange value of electricity, which leads to the disembeddedness and the capitalisation of the infrastructure. Unlike the situation in the past, when the generating and transmission of the electricity were fully integrated with the everyday life, electricity as a commodity is now defined much more by its formal characteristics than its substantial character. As a result, users will treat electricity as something with no history and take the infrastructure for granted. This is how infrastructure is normalized in society and why society mistakenly treats it as stable (Furlong, 2014, p. 462). Since the tourists and the newly-arrived businessmen have got used to the stable delivery of electricity in the cities, they complain more about the precarious electricity conditions in Huangyao, more than the local villagers do.

This section showed the upgrading of the electricity infrastructure being paralleled by the upscaling of Huangyao's tourism project. Influenced by the institutional change brought by the industrial reform in China in the past two decades, the electricity infrastructure has been disembedded from other social institutions with which it used to be intertwined. Uplifting it from its local community, Huangyao's tourism project has been abstracted as a resource by the regulations of ever higher level local states. The electricity infrastructure upgrade was triggered by the up-scaled tourism project. In return, the upscaling of the tourism project was facilitated by the new method of electricity delivery which was mainly mediated by the exchange value of the infrastructure system and no longer substantially mediated as it was when the electrical matters were integrated within the everyday life of the local community and constricted by the non-electric institutions around it. However, the planning of the electricity upgrade did not guarantee the success

of the upgrade in practice. Since infrastructure is closely related to everyday encounters with its users, a discussion of the realpolitik of electricity should not be ignored.

5.4. The Realpolitik of Electricity Delivering: towards Endless Disputes

In the previous sections 5.2 and 5.3, the effect of the institutional change of the electricity infrastructure was articulated through the transformation of electricity from a substantial to a formal commodity. The reform of the Chinese power industry was the critical event through which this transformation happened. The different attitudes held by local residents and business owners when facing electricity deficiency reveal the institutional changes to the electricity infrastructure. It is obvious that, from the perspective of the local residents and the newly arrived business owners, the electricity infrastructure is treated as something different even though its effect run along the same electricity wire. Therefore, it is critical to examine the implementation in practice of the electricity upgrade by documenting the different strategies of different agents aimed at making the electricity run through the ancient town. Although all the agents want better electricity conditions – the local villagers, the tourist business owners and the state-owned businesses leaders – there is no consensus in their diversity agents. It is hard to step out of the non-communicable situation which in the has led to the failure of the electricity upgrading.

Unexpected Restrictions from the Local Community

To upgrade the electricity infrastructure in Huangyao will need the support from the power supply department. The planned 110kV Huangyao substation and the transmission lines were invested in and constructed by the Zhaoping Water Resources & Electric Power Co., Ltd. (ZWEC for short). As the only legal person¹⁰⁹ for the power supply in the Zhaoping County¹¹⁰, the ZWEC is responsible for the construction and the transformation

¹⁰⁹ In the field of power transmission and distribution, there is still no admission to the market in China at this moment.

¹¹⁰ In March and September of 1998, 55 power supply units got a license to supply power, issued by the Guangxi Electric Power Industry Bureau, Autonomous Region Economic and Trade Commission, the Planning Commission and the Water Resources Department. The power supply units were relocated within their power supply area, without any cross-power supply or missing power supply. Data extracted from *The History of Electricity Industry of People's Republic of China – Guangxi Volume* (Bianweihui, 2004, p. 420).

of the urban and rural power grid¹¹¹. The construction of the substation was completed in June 2013 and not until August 16th 2016 was the Huangyao substation able to be connected with the Jiangkou 220kV substation of the Hezhou Power Supply Bureau. At this point, the Huangyao region was directly connected to the China Southern Power Grid, mediated by the tourism project, and the hardwiring of the power supply on the macro level was upgraded.

On the micro level, the local office of the Zhaoping Water Resources & Electric Power Co., Ltd. (ZWEC) is the Town Administration of Power Supply (TAPS for short). TAPS is responsible for the construction of the distribution lines (medium and low voltage transmission lines) within Huangyao town, maintaining the everyday work of the power supply system, as well as charging the customers according to their meter readings. As noted in the previous section, after the reform of the Chinese power industry in 1998, although the power supply departments were still owned by the state, they were made independent of the administrative system. Therefore, the everyday work and the mission of the TAPS do not directly service the Huangyao tourism project led by the local governments. Instead, what concerns the company is, first, whether the construction of the electricity infrastructure is technically feasible according to the town's master plan and the Ancient Town's protection plan; second, whether the scale of the electricity market in Huangyao matches their investment. As a result, it lay outside the responsibility of the power supply department to deal with any restrictions from the local community during the electricity upgrade.

In order to protect the traditional landscape of the Ancient Town, no telephone poles could be erected inside it to carry the electricity wires and they all had either to go through the backstreets, or under the paving stones (see Section 5.3). But this invoked the

¹¹¹ According to the National Planning Commission and the State Power Corporation of China, in 1998, Guodian Guangxi Power Co., Ltd and Guangxi Water Resources & Electric Power Co., Ltd, were indicated as the loan commitment unit, which was responsible for organising and implementing the construction and the transformation of the urban and rural power grid in Guangxi. Data extracted from *The History of Electricity Industry of People's Republic of China – Guangxi Volume* (Bianweihui, 2004, pp. 354–362). Zhaoping Water Resources & Electric Power Co., Ltd. is the subsidiary corporation of the Guangxi Water Resources & Electric Power Co., Ltd in the Zhaoping County, founded by the Guangxi Water Resources & Electric Power Co., Ltd and Zhaoping Huineng Power Co., Ltd in December 28th, 2003. Data extracted from the official website of the Management Committee, retrieved on September 2nd 2018, from <http://www.zpsldy.com/html/wqzly.html>

restrictions due to the physical fragility of the building structures, as well as the internal and defensive cultural traditions of the local community. Most of the houses in the ancient town were either built two to three hundred years ago and have no existing external structure to hold electricity wires, or the building materials are too fragile, such as rammed earth walls, to support electricity wires. For some masonry houses, making a support structure along the outer wall and under the eaves would solve the problem. However, the same thing would cause cracks in the walls of some rammed earth houses, which are not strong enough to support the tension and weight of the wires; or even the collapse of the building. Moreover, since some structures attract an excessive electrical load all the time, the overheated wires might pose a fire hazard. Therefore, the local residents do not want electric wires to pass through the walls of their houses without effective protection. An underground pipeline is the other option for laying the power lines. However, laying a pipeline in such narrow streets in the Ancient Town¹¹² would inevitably cause damage to the house foundations and disturb the landscape of the Ancient Town.

The narrow streets and building structures are difficult to reconcile with the needs of a modern lifestyle which is based on infrastructures using various types of engineering pipeline. This is why the local residents have not allowed the new electricity wires to pass through or go under their houses. Facing this difficulty, the power supply department does not have any viable solution but to delay the upgrading of the electricity infrastructure within the Ancient Town.

Moreover, besides the physical obstacles, cultural restrictions have delayed the upgrading of electricity caused by tourist activities. When the buildings in the Ancient Town were built hundreds of years ago, they were designed to defend the residents in times of war and to preventing thieves from looting properties. The structures on and near the main streets are mainly two-storey courtyard buildings building made of hard masonry, with high thick walls. As one walks further into the house to the second and third courtyards, one realises that the walls are becoming much lower and the defensive structure is

¹¹² According to *The Protection Plan of Huangyao as the National Famous Historical and Cultural Town, Specification*, (Guangxi Urban-Rural Planning Design Institute, 2008a, pp. 10–13), the most spacious street in Huangyao Ancient Town is Yingxiu Street, is about 5 meters across; and the narrowest street is the Yangxiangkou on Jinde Street, which is about 2 meters.

replaced by a life-friendly structure. This suggests that although the external design of the residential buildings has a strong defence function, the internal boundaries between the interiors are weak. From the sunbathing platform in the back yard of the house, residents can reach in all directions to other households (Guangxi Urban-Rural Planning Design Institute, 2008a, p. 9). This may be interpreted as the internally-oriented culture of this town. Such an idea is also supported by the ancestral hall culture which dominated the entire town of Huangyao for hundreds of years. It housed eight clans and 10 ancestral halls. Long ago, the residential buildings were distributed around its ancestral halls and lived in by people who shared the same family name and were one another's neighbours. Relationships within a family clan are close. Even nowadays, funding is raised when the clan gathers during traditional festivals (see **Figure 20**). The name of the clan members as well as the amount of money each has donated are recorded and posted on the wall of the ancestral hall. The funding is held by people of good repute within the clan and used when clan members are in difficulties.



Figure 20. A photo of Wu’s ancestral hall. The red poster on the wall recorded the donation from each clan member at the Death Festival in 2014. Source: photo credit by the author, July, 2015.

However, the record in **Figure 20** and records from other ancestral halls that I saw during fieldwork show that although such a clan funding tradition still exists, the clan members are no longer living in the same area. Some have already moved to other counties and cities. As the tourism project is fast developing in the Ancient Town, the original population structure has dramatically changed. The next door neighbours are no longer relatives who share the same family name. Instead, they are strangers from far away cities doing business or going sight-seeing in the town. The close relationship among local residents living in the town based on family ties has been replaced by a relationship based on the tourism business.

No matter how much change tourism has brought to the town, the questions remains whether the unstable electricity supply has also been inconvenient for the local residents. Why do they not approve an upgrade of the infrastructure and were they not affected by this instability before the boosting of tourism? In fact, before this boost, when the electricity supply was under rural management system, the local residents were used to its imperfections, but since the advent of tourism the electricity service has been severely

degraded, due to the fast growing electricity demands by tourists and tourism-oriented businesses. But why not take the opportunity offered by tourism to upgrade the infrastructure? What negative effect of electricity upgrading would most concern the local residents? In answering these questions, we will be able to convey the nuanced relationship between the local villagers and the migrant business owners, and also with tourism development in the broader sense.

The upgrading of electrical infrastructure is not merely a question of new wiring and a connection to a higher voltage input. In terms of everyday life, as argued in the previous chapters, what the physical electricity wires manifest is not only a politico-economic construct, but also evidence of changing social and cultural conditions. In previous paragraphs it is argued that the architecture of the town is a result of its culture. The boundaries between neighbouring back gardens were not as strict as the view from the front door might suggest. Such a layout makes sense in a neighbourhood which contains people from the same clan or who have been neighbours for decades. However, now that the tourists have arrived and new guesthouses have been built, the people who live next door are no longer what they were before: relatives who share the same family name. The open space and the unstrict boundaries at the back yard were gradually replaced by strangers and new buildings. Take the example of the Relevant Boutique Hotel. Before the Relevant Boutique opened, the house had only two courtyards. The place where the third courtyard of the Relevant Boutique stands used to be a pigsty, but is now the location of a two-storey building. Tourists can see almost everything in the next door building from the corridor on their second floor, and the old one-storey buildings are at the same time, “buried” among the tall new buildings.

Needless to say when people are inconvenienced by the development of tourism, it takes time for new neighbours to understand one another and win each other’s trust. Since the infrastructure for electricity has to go through everyone’s back garden and cannot easily be moved again for some time, people have to think very carefully in advance about whether they should allow it. Local house-owners told me in their interviews that if they agreed to let the new electric wiring pass through their house, it would be difficult to change the structure of the house in the future. If they wanted to move the wiring even a little, they would have to call in professional electricians and then foot the bill for the work. The best way to push things forward is to have a trustworthy third party, which guarantees effective negotiation and reconciliation if something goes wrong. In the past,

when most of the residents had the same background of kinship, it was very easy for the clan leader to function as this third party. But nowadays, no particular party or person is eligible for this role, since all the relevant stakeholders have become either rivals or in a mutually exclusive relationship with the authorities under the tourism development model.

This reveals the nuanced relationship between the local villagers and the migrant business owners. From the perspective of the local residents, when discussing their private relationship with a business owner, they do not hesitate to say that they are “good friends.” But whenever the discussion moves to the issue of upgrading the electricity supply, they say “there will be no compromise, and this is about principle”. The business owners will try every possible technical method (as discussed in Chapter 6) of increasing the power supply to their own business. But everyone is also clear that no matter what they try, the overall supply of electricity does not increase. This is what undermines the electricity grid and shows how its upgrading is delayed.

A Non-communicable Situation and the Effort of Individuals

To overcome the difficulties during the implementation of the electricity upgrade needed the coordination and regulation managed by governmental departments. They are responsible for all the administrative process regarding the electricity upgrade and should have coordinated those involved, informing and obtaining permission from every household connected by the electricity wires before the new power line was actually implemented. However, since Huangyao Town has been up-scaled under the direct regulation of the Zhaoping County Government and the Hezhou City Government through their local offices known as the SAA and the HTIMC, the town government has lost most of the benefits from and responsibility for the tourism project. Therefore, there is not enough governmental support on the ground to connect the general administrative system to the local community. Furthermore, since Huangyao has been disembedded as an abstract project run by the SAA and the HTIMC, although the upgrade of the electricity infrastructure is written on their work list, other more important issues before the electricity upgrading concerned the means of financing the projects listed. The official channel mediated by the governmental department to get consensus among all the residents could not effectively work out how to proceed.

In the end, only the heavy users of electricity, the individual business owners, are anxious about the electricity supply and everything related to its upgrade. The shop owners need

electricity to maintain the daily operations of their businesses, such as lighting the bulbs that decorate their guesthouse, supporting the phonographs for background music, or, at least, activating the air cooling system and the water heating systems to guarantee a comfortable living conditions for tourists. When we focus on individuals' everyday business activities, electricity is the necessary production material for the tourist businesses. Without electricity, the quality of the service is deficient. Business owners have to pay compensation to their guests and explain the situation in speech after speech to prevent the guests from writing negative comments on their guesthouse online platform.

Although the business owners are extremely concerned with the upgrade, since most of them are newcomers engaged in small scale business, they are neither influential enough to persuade the local residents to agree with the upgrade plan, nor powerful enough to negotiate with the governmental department to mover the upgrade forward faster. This is why the owner of a guesthouse told me "I'm really looking forward to the new electricity wires; however, the longer I stay in this village, the clearer I am that what we (shop owners) can do is limited."

As the tourism project is developing faster all the time, the electricity load of the Ancient Town gets bigger and bigger. But the institutional change in electricity from the substantial commodity of the planned era to the formal commodity of the market oriented era gives the business owners a possible space in which to stretch existing power relations, with a proper way of justification. From the perspective of individual business owners, Huangyao is a place where they come to do business and make a contribution to Huangyao's tourism as a form of real estate investment, tax paying, consumption stimulus, as well as job providing. In the end, however, they cannot even get access to a basic electricity supply though they pay the bills according to the amount of electricity they use. Therefore, from their perspective, any negative consequences should not have been borne by individual shop owners and local residents. It is the governmental departments, which initiated and should have coordinated the implementation that should take responsibility for the electricity shortage. Therefore, the individual users will not accept any restriction on their use of electricity. In their opinion, they have the right to use whatever means are available to compete for basic electricity support. This is exactly what is discussed in Chapter 6. It focuses on the forming of liminal space through the competition for electricity by using electric devices which simultaneously cause the redistribution of electricity and of the power around the community.

5.5 Summary

As a follow-up to the previous chapter which discussed how electricity became the main problem of the state-led tourism development of Huangyao, in this chapter, the main story focuses on the disputes over the upgrading of the electricity infrastructure. Non-communicable practice, which gathers together the various attitudes of the relevant agents to the electricity upgrade, including the constructor, the local villagers, the individual tourist business owners and the state-owned businesses leaders, explains why the problem of electricity infrastructure could not be solved under the up-scaled state-led tourism development model.

Two factors were recognised which led to the non-communicable situation. First of all, to start from the electricity itself, this research adopted the historical approach to look at the way in which electricity was and will be supplied in the place where the tourism project happened. It was shown that the rural electricity reform was a critical point, before which the electricity infrastructure functions as substantial commodity but afterwards as a formal commodity. In the former, the construction, regulation and the everyday operation of electricity delivery are closely bound in with each other. This integrates the activities requiring electricity within the everyday life of the local community and restricted by other non-electric institutions. In the latter, especially after the institutional reform of the rural electricity system, the electricity functions as a formal commodity. This argument is supported by the accountability oriented organisational change, the adoption of private and pre-paid meters, which conceal the use value and magnify the exchange value of electricity. Working together with the institutional change to the electricity infrastructure is the upscaling effect of the tourism project, which lifts the tourism project away from the local community to be regulated by local offices of the county and prefectural level governments. It triggered the upgrading of the electricity infrastructure by the ever growing volume of tourism and thereby the institutional change of the electricity infrastructure was brought into practice in Huangyao. As a result, all the agents relevant to the tourism project are gathered together by the activity of electricity upgrade, through which their different attitudes are expressed.

Among the findings presented in this chapter, a contradiction may have been perceived: the upscaling of government involvement in Huangyao seems, on the one hand, to attach more importance and resources to the town, but, on the other, none of this apparent help

from the upper bureaucratic system seems to support the upgrading of infrastructure. One is compelled to ask why the prefectural level government, which supports tourist development, would not support the upgrading of the town's infrastructure and ensure that it took place, Why is there a plan which requires an upgraded electrical infrastructure when the actual work on the ground stops in limbo, well before this point? Isn't the growing electricity demand linked to the prosperity of the tourism project such that further development depends on ensuring adequate infrastructure?

Hitherto, the unsuccessful infrastructure upgrading as well as the current unstable infrastructure system had been hidden in the background, but now it has moved to the front of the stage. Apart from what was said in the last chapter about its being a process through which the awareness of its users is awakened, the above questions also guide the research to go backwards and explore every aspect of the infrastructure upgrading that has led to this impasse. The development pattern of Large Technical Systems (LTS), such as an electrical infrastructure system, according to Edwards (2003), is 'visible only on historical time scales' (ibid., p. 199). It points to the importance of adopting a historical approach. To avoid generating only descriptive historiography, it is helpful to adopt the viewpoint of the Social Construction of Technology (SCOT), which enables more aspects and factors to be examined, such as letting "power or economic strength enter the description" (Pinch and Bijker, 1987, p. 34). What is most relevant to the current research is that focusing on its various obstacles and conflicts may reveal more than a concern with the smooth development of technology.

With these ideas in mind, when examining the institutional changes of the electricity supply and bureaucratic upscaling of the Huangyao project, we may gain more understanding of the uncommunicable situation if we explore it at ground level than if we criticize one party's irresponsible involvement. The upscaling of government involvement has been significant for the planning and decision making, including the planning of the improved electricity supply. The upgrading of the electrical infrastructure is confirmed in the form of mains electricity cables on the main roads in the new town and around the outskirts of the Huangyao Ancient Town. No specific description has been written of the way in which the electric wiring will be implemented at ground level. In other words, the plan and the importance attached to Huangyao is more like a vision adumbrating the beautiful future of the town than a plan for the implementation of infrastructure in practice, especially when its upgrading concerns the ancient town, where

physical and social conditions are complicated. However, this vision does not help the people who are affected by the inadequate infrastructure and must surmount more practical obstacles. For example, how should they deal with the damage to their houses caused by the construction of infrastructure? Besides reminding us of the dilemma between the beautiful vision and the crucial reality, it may also indicate how the gap was formed, and whether or not it can be repaired.

Chapter 6 Competing for the Electricity and Political Infrastructure

6.1. Introduction

It has been discussed in previous chapters that the electricity infrastructure plays a critical role in understanding the problem hidden behind the state-led tourism model (see Chapter 4). This problem lay in the fact that the electricity deficiency could not be made good through “conventional” negotiation, since the human agents involved in the electricity upgrading could not come to an agreement (see Chapter 5). In this chapter, with a special focus on the everyday competition between the active users for electricity, I want to examine how the tourism project is implemented in conditions of a poor electricity supply, by manipulating/being manipulated by the infrastructure and to show what kind of public participation is formed.

Before the tourism project was implemented in the Ancient Town, the old electricity infrastructure system was capable of support the town’s everyday needs and the local residents’ lifestyle. However, things have changed during the past ten years. The fast growing tourism project was like something dropping from the sky on the local community. Its everyday life, including the electricity infrastructure which runs through and supports the entire Ancient Town, has not developed a mechanism suitable for catching up with the rapid changes brought in by the tourism economy as it developed. This suggests that, if anything outside the previous coherent system had been introduced, the workings of the electricity system would have needed to make some changes. The old electricity system simply lacked the capacity to adapt itself to the new situation, until the invention of “electricity boosting” by individual users.

When the business owners first entered the Ancient Town, very few of them had ever thought that they would have had to suffer frequent blackouts. They rented houses from local residents and transformed them into guesthouses. Instead of putting most of their

effort into the everyday management and business branding of their guesthouses, the most important and urgent thing they have to deal with every day is maintaining the normal operation of their “electrical hardware”. According to the maintenance record kept by a guesthouse owner in the Ancient Town, more than 300 electricity cut-offs occurred in the year 2016¹¹³. The sub-standard conditions did great harm to his business and hence to the reputation of the Ancient Town. Living with the precarious electricity supply and momentary blackouts (or blackouts that came without warning), the users discovered by that adopting a particular electric device, such as an electric stabilizer, might improve the supply within a small range, although it was hard to affect anything on a bigger scale. Business owners had already equipped their shops with various technological devices, first, to protect their business from further loss and, meanwhile, to protest and negotiate for a better electricity supply.

The electricity boosting, which is done by the business owners, moves the inflexible old system from the background to the limelight at any moment when it breaks down. It turned the electricity infrastructure into something that has to be deal with, rather than a subordinate service taken for granted behind the wall. At the meantime, the rivalry for electricity contestation initiated by the electricity boosting destabilized the electricity infrastructure, through which a liminal space¹¹⁴ is formed where the electric and power resources are redistributed among the agents concerned. Since, as the government expects, the state-led tourism project promotes this Ancient Town as a popular tourist destination, considerable numbers of ventures and tourists are attracted to the area. However, an unforeseen convergence of circumstances has become the insurmountable obstacle to the tourism project, formed by the private households, who were from the beginning ignored by the tourism project, and their everyday encounters with the infrastructure. The

¹¹³ The record was kept by Li, a guesthouse owner on Tianran Street, in the centre of the Ancient Town, next to the relevant boutique Guesthouse. Every major blackout that took place in the town, he would “report” and “record” on his social media account. For example, he wrote that during the peak season on 1st July 2016, there was the 286th blackout in Huangyao; and on 22nd August 2016, there was the 316th. A day after that, there was the 318th blackout which lasted for 5 hours. The wiring of the town was upgraded during July (see Section 6.5). However, it did not improve the flow of electricity. The blackouts stopped with the 336th by the end of the same year and the electricity deficiency continued in 2017.

¹¹⁴ In this research, “liminal space” refers to the point where the planned meets the satisfactory and the formal meets the informal.

breaking down of the electricity system shows in its own way the incompetence of the state-led tourism development model.

Infrastructural projects, such as the waste system, the transportation system and the water supply system, etc., characterize the urban politics in almost every city all over the world today. On the one hand, recognizing the absolute importance of the infrastructure systems in our modern life, it is widely believed that societies are deterministically shaped by technological systems. “[M]assive complexes of contemporary urban infrastructure are the embodiment of Enlightenment dreams of the social control of nature through advances in technology and science” (Graham 2010, p.4). However, on the other hand, the question arises whether, behind this assumption, everything depends not on the infrastructure but on the efforts of state policy makers, city boosters and infrastructure providers, to legitimize the infrastructural projects silently implanted in our lives. As long as the infrastructure projects work properly behind the scenes, they have no chance of coming to the awareness of those at the front of the stage. But, as the business owners are experiencing in the Ancient Town, sooner or later the social and power relationships embedded in the infrastructure system may be black-boxed.

Infrastructure politics, which is presented in the form of the “fight for electricity” in this research, is not concerned with who or which group of people will succeed in monopolising the use a certain kind of infrastructure. The discussion is neither about who gets the access to the infrastructure, nor about whether the government, the local residents or the private business owners who will benefit more from the construction of infrastructure. The above ideas are no more than an instrumental view of infrastructure, which inevitably treats the components of electricity infrastructure as “mere things” and “mere objects”. In this sense, the infrastructure is still apolitical, which means that it is the politics of the people using the infrastructure, but not the politics of the infrastructure itself. The active users and infrastructure approach in which all may participate (see Section 2.4) provides a perspective from which to understand the inter-relations which led to the study of the process of tourism development in this research. In the following studies, the everyday use, payment, repair and maintenance of water (de Laet and Mol, 2000; von Schnitzler, 2008; Soppelsa, 2009; Anand, 2015; Björkman, 2015, 2018), power (von Schnitzler, 2013; Gupta, 2015), communication (Fischer, 1992; Donovan, 2016), transportation (Nolte, 2016) and waste (Kallianos, 2017) infrastructures are put in the centre and shown to make a difference. Material and practical knowledge are emphasized.

They address an account of “the role of technologies, settings and objects in the performance of public participation” (Marres, 2012, pp. 22–23). In the following discussion, I investigate the process of competing for electricity, from which we can see how electricity and human actions work together to form a material- based public “discussion”.

The basis for this chapter is mainly drawn from my fieldwork research in two guesthouses in Huangyao Ancient Town through participant observation. I worked twice as a receptionist in these guesthouses. The first time I went there was the summer of 2015, when one of them had first opened for visitors. What impressed me as a researcher was that, for every guesthouse keeper in the Ancient Town, methods of dealing with the inconvenience and loss caused by the lack of electricity had almost become a way of saying ‘hello’. After this, I began to pay attention to every detail and conversation related to electricity and gradually came to see it as the entry point that could work for my research, although it brought some unexpected difficulties to my receptionist work. In the spring of 2017, I visited the town again, since I had been told by the guesthouse owners that the bad electricity infrastructure had been upgraded in the Summer of 2016. The second visit showed me the different conditions before and after the upgrade. However, although the old electric wires were replaced by new ones, according to the interviews with guesthouse owners, it was still not the end of the story. Besides the participant observation, I also held semi-structured interviews with guesthouse owners and local engineers who knew something about the electricity infrastructure and electric devices. For descriptions of the key events of this electricity upgrade, this research also refers to the diaries and social media posts of the guesthouse owners.

6.2. Re-cognizing Electricity Infrastructure

Before the new electricity wires were installed as planned, the people who were living and doing business in the Ancient Town still had constantly to encounter the old precarious electricity wires. In this section, I focus on how the local residents, shopkeepers and other relevant participants dealt with the old electricity wiring and what strategies they adopted when faced with failures of electricity. Through the observation of their everyday interaction with the electricity, as well as in the interviews and free chat with them, I collected for analysis their strategies, ideas and attitudes regarding the poor condition of the electricity supply. On this basis, it was clear that the role played by

infrastructure in such conditions is widely different from what people imagine and experience in normal power conditions.

Unstable Infrastructure: from the Backstage to the Forestage

While I was doing the first fieldwork in the Ancient Town, my research was mostly based in two guesthouses, one called the Relevant guesthouse, the other, the Relevant Boutique guesthouse. Located on the same street, both had been transformed from ancient residential houses. Each of them has three halls, two courtyards and guest rooms on the ground and first floors. Hong and Mao are the current owners of these two guesthouses. In June 2015, the Relevant Guesthouse was first put into operation; and two months later, the Relevant Boutique Guesthouse was opened. The Relevant is known as an older guesthouse, because it was taken over from its previous owners¹¹⁵. Before the recent spurt of growth in tourism, there were too few tourists to make an electricity shortage critical for the business owners. However, after Hong and Mao took over this guesthouse, with the prosperity of Huangyao's tourism industry appeared the problem of the electricity cuts. When the electricity supply is stable and sufficient, the voltage remains at 110V¹¹⁶; but at peak times the voltage becomes extremely unstable, fluctuating between 0 and 110V.

The unstable and insufficient power supply always made the lights flicker and the electronic fans work intermittently. Sitting in the main foyer of the Relevant Guesthouse was like sitting in a cave, with a torch flickering in the gusty wind. In summer, the weather the south of China is very stuffy. And since the old house was built without a waterproof layer, every room in it was always humid. These conditions are very friendly to various kinds of native insect and mosquito, which are extremely energetic in the summer. It is hard to imagine how a guesthouse could survive without the proper control of temperature, light and humidity that its guests depend on. Most of them come from modern cities where they can live in the natural environment without any human intervention. But, as a key

¹¹⁵ About 10 years ago, the house that the Relevant Guesthouse replaced was transformed by its first owner into an 11-room guesthouse named Ziyue. It has been operated and transferred by several owners in the 10 years before it was taken over by Hong and Mao. In June 2017, The Relevant Guesthouse was again transferred to a new owner.

¹¹⁶ In China, the standard voltage supply for household electricity consumption is 220V and for industrial and commercial users, the standard voltage is 380V.

factor of infrastructure to modern life (Edward, 2003), the electricity infrastructure has become one of the most critical factors, since it can

“constitute an artificial environment, channelling and/or reproducing those properties of the natural environment that we find most useful and comfortable; [...] and eliminating features we find dangerous, uncomfortable, or merely inconvenient” (ibid., p. 189).

From city to town, business owners started to realize that electricity was not something that appeared so long as they paid their bill. Instead, it now seems one of the key materials on which their everyday life is built. In this way, the electricity infrastructure moves from backstage to the limelight at precisely the time that the modern image of an environment controlled by infrastructure breaks down.

The uncertainty of the electricity system, therefore, became the target of complaints from both the tourists and the shop owners. The tourists complained that the guesthouses, which they had paid to stay in, could not provide a good standard of living. The air conditioners and other electrical appliances which were included in the room service did not work properly. The shop owners were equally displeased; they had invested much money in reconstructing their houses and equipping them with modern electrical appliances. However, all the efforts were counted for nothing due to the power supply problem which could never ever be solved. As a result, the guesthouse owners always had to tell every guest about the electrical difficulties they were facing and beg their understanding. Sometimes they even had to give the guests their money back to prevent them from writing negative comments on the guesthouse-booking platforms. Otherwise, the reputation of the guesthouse and the Ancient Town would both suffer disastrously. To develop the idea in the previous paragraph, electricity is experienced as more than something in the background which remains there by the prompt payment of bills and the problem caused by the substandard infrastructure cannot be solved by economic instruments alone. Instead, the state of the electricity infrastructure is directly related to every aspect of running a guesthouse and has an impact on the owner’s reputation through guests’ reviews. In everyone’s concrete experience, the infrastructure has moved into the limelight.

Learning from their experience with the Relevant Guesthouse, Hong and Mao invested more effort, ideas and money in the Relevant Boutique Guesthouse, which they transformed from a historic house, leased for 20 years from a local resident. In order to

construct a guesthouse that was personal to them, Hong and Mao invited a famous architect from Beijing to provide an architectural design. From the photo and the conceptual design rendering shown by **Figure 21**, **Figure 22** and **Figure 23**, it can be seen that the Relevant Boutique expresses their image of the ideal lifestyle, which combines the exquisiteness of modern life with the simplicity of rural life. In particular, a luminaire design used in the guesthouse to adjust the sense of space and atmosphere, not merely for general practical lighting purposes. In order to prevent power-cuts from hindering the design effect, the guesthouse owners during the reconstruction put extra effort into improving the interior power system of the Relevant Boutique. The internal circuits of the guesthouse adopted the thickest electricity wires. This kind of power line can withstand for a long time a low and unstable power supply¹¹⁷. The most important strategy was to use regulators, sometimes known as voltage stabilizers¹¹⁸. Like other guesthouses in the Ancient Town, the Relevant Boutique uses this electric device to prevent dramatic losses of voltage when the electricity supply is not stable.



Figure 21. Photos of the first hall of the Relevant Boutique Guesthouse. Notes: On the left is the entry door and the reception area; on the right is the mini bar,

¹¹⁷ In the case of unstable voltage or low voltage, the current ($P=U*I$) must be increased in order to ensure the normal operation of electrical appliances. The increase in current produces extra heat and the thicker wires in this case can survive longer than thin wires can.

¹¹⁸ A voltage stabilizer/regulator is a device to automatically maintain a constant voltage level in the electricity system which it is connected to. By regulating the electricity “running through”, it provides protection to both individual electrical devices and the system as a whole by providing steady voltage.

which is open not only to current guests but also to the public. The old appearance of the house is preserved in the wooden ceiling, the brick exterior wall and the black wooden main door. Source: photo credit by the owner of the Relevant Boutique Guesthouse, June 2015.



Figure 22. Photos of the second hall of the Relevant Boutique Guesthouse. Notes: This shows the courtyard, the corridor on the ground floor and the common room for the guests. Although the part of the main structure of the old building remains, the entire appearance has been changed to a Japanese Rock Garden. Source: photo credit by the owner of the Relevant Boutique Guesthouse, June 2015.



Figure 23. The conceptual design rendering of a bedroom in the Relevant Boutique Guesthouse. Notes: The appearance of all the guest-rooms continues the same visual effect, although the rooms may vary from one to another due to limitations of space. Source: pictures authorised by the owner of the Relevant Boutique Guesthouse, June 2015.

However, depending on stabilizers was not a sustainable way to run the guesthouse. The voltage stabilizers were always overwhelmed since they had to boost the voltage all the time. I could always hear the guesthouse owners complaining of overworked, burned-out stabilizers. A voltage stabilizer costs three to five thousand RMB and needs to be replaced or mended very often because it is worked so hard. Some business owners even tried to use two voltage stabilizers at the same time. They either use the second voltage stabilizer to stabilize the voltage for the first one, which gives it one layer of protection; or they split the electric load into two parts controlled by two stabilizers. However, the improvement is insignificant. If these conditions got no better, a guesthouse owner said ruefully, the whole guesthouse would be full of voltage stabilizers.

Equipped from Head to Toe

On August 8th 2015 the Relevant Boutique had its very first electricity crisis, part of a major electricity crisis that affected the whole town. It was a Saturday and many tourists were staying in the town that weekend. Everyone wanted to use the electricity at the same time, leading to a very weak power supply for each guesthouse. Very few guesthouses had enough electricity for the air conditioners to work. Relevant Boutique became almost the only guesthouse in the Ancient Town to provide air conditioning. The Relevant Boutique achieved its first full house since its opening. While the other guesthouse owners were busy apologizing to angry tourists, in the guesthouse lobby of Relevant Boutique, the owners and the guests were chatting about the power problem in the Ancient town.

One guest (Guest A) suggested that all the guesthouse owners should form a guesthouse union. In this way they could get support from each other and become more influential in negotiations with the local government and the local residents to improve the infrastructure system. However, after hearing about the complicated situation of electricity upgrading (see Section 5.4), Guest A realized that in this situation there was no way out. The two-fold reason for his efficient air conditioning in Huangyao Ancient town in a peak house in the peak season, was his benefiting from the guesthouse's excellent geographical location and from the vast investment in hardware by the owners. In other words, a better electricity supply does not come from public negotiations, but depends on luck, such as the better location of the Relevant Boutique and personal effort, such as improving the interior power system. Having sat through too many useless

negotiations, the owner Hong told me that he and Mao had spent so much money on their second guesthouse merely because they no longer wanted to get involved in the disputes of local residents, local government and their complicated conflicts and negotiations. They did not worry about the extra investment if it could help by upgrading the electrical system. However, as he noted, “sometimes I find there is very little we can do”.

Another guest (Guest B) who joined the conversation called the Relevant Boutique the winner of the electricity battle in the town. “Since the owners of the Relevant Boutique had put so much effort to solve the electricity problem, it was time for their guesthouse to get something in return”. These words show that there was a competition going on among all the electricity users when too little electricity is provided. Since the Relevant Boutique has invested in much “equipment” for this battle, they deserve a victory. It is true that, from this perspective, the infrastructure, which is normally treated as a public utility, becomes the subject of contest. The role of the voltage regulator may have seemed an emergency safeguard, which provided an alternative for a private purpose when the public utility system could not work properly. But what is this battle for? And, if the Relevant Boutique wins, who loses?

It should be noted that the competition for electricity by using a voltage regulator, adds nothing to the existing infrastructure. It means that the voltage stabilizer only raises the competitiveness of individual guesthouses. Therefore, what we cannot ignore is that, although the guesthouse owners were in competition with each other, the Relevant Boutique could not be considered the final winner. While the Relevant Boutique was “winning” the battle for electricity consumption, the other Relevant Guesthouse was “suffering”, due to the downstream location of its main connection. And things might have gone worse if the electricity load had been too high, for the main electricity wire would have caught light. Hence, there were no actual “winners” in this battle. As Mao, the other owner of the Relevant and Relevant Boutique Guesthouses noted, since the Relevant Boutique had a lucky location and they had already put more effort into it than they had wanted, they would not allow the Relevant Boutique to endure a poor power supply. Thus all they could do was to equip the Relevant Boutique with the best electrical hardware. However, since they all knew that the real problem was not a lack of hardware but the everlasting negotiation and conflicts between local residents and local government within the area of the Ancient Town, they would not put the same amount of effort into

the Relevant Guesthouse. In despair, they chose to leave the electricity supply of the Relevant in its original condition and let it suffer with the other guesthouses in the town.

Almost every guesthouse was facing similar problems with various kinds of infrastructure, including electricity, water, gas, etc. What they could do was to install kindred devices to the voltage stabilizers to “boost” electricity when the voltage is low. A voltage stabilizer is like a suit of armour. Every individual shop owner equips himself from head to toe, by upgrading his own electrical wiring and buying voltage stabilizers, or by digging his own well for water ¹¹⁹. Only by these means do they feel less uncertainty in the battlefield of interrelated infrastructures. Sometimes the owners of guesthouses joked that each of them might build an independent generator to meet the situation. If that happened, their lives would be genuinely “self-sufficient”. They would have no need to rely on any public utility infrastructure systems at all.

In the developed world, infrastructure should be “largely responsible for the sense of stability of life” (Edward, 2003, p. 188). Ironically however, as we see from the condition of the infrastructure in the Ancient Town, the risk comes from the infrastructure itself. It is a risk originating in the lack of effort and ability to regulate infrastructure, which is a socio-technical system born out of contingency into ambivalence (see Section 2.4). To avoid the risk of relying on tap-water, people have to turn to nature for “help”, such as using the water from the wells and underground rivers; or, they turning to the distant infrastructure needed to produce and transport bottles of mineral water.

It should be noted that in modern culture, nature is considered something unprocessed, unstable and even risky. However, this view ignores the other side of nature: that it is “inexhaustible”, in contrast with the temporary stability of the commonly known

¹¹⁹ Akin to its reaction to the electricity infrastructure, the Relevant Boutique had already built up a well-water system, which was totally separate from the tap water system. The owners told me that their first choice was not to use the tap water provided by the government. The system was not reliable and no one could tell when the system might stop working. Moreover, according to local people, the water that came out of the taps was sometimes yellow in colour and smelled strange. Unlike the unreliable tap water infrastructure, the well, which had been used by local residents for hundreds of years, would never “stop working”. The well water comes from an underground river flowing across the town, so the water from the well is always abundant and “clean”, so long as it is not polluted. Meanwhile, the Relevant Boutique also provided bottles of mineral water for people to drink. In this case, the tap water infrastructure system, which should have worked as the most reliable public utility system in modern life has become the second or even the third choice, and the “well water plus mineral water” model become the “reliable” choice.

infrastructure. It once again reminds us of the nature of infrastructure and its relationship with modernity. In fact, scholars acknowledge that modernity, instability and infrastructure disorder go hand in hand. Noted by Kallianos (2017, p. 4) “infrastructural (dis)order is closely connected with ideas of what it means to be modern”. Similarly, Soppelsa concluded when he studied the water and sewage infrastructure in Paris during 1870-1914, that, for urban modernity, “contingencies, contradictions, complexity and fragility” offer a new perspective from which to view modernity and infrastructure (Soppelsa, 2009, p. 2).

Infrastructure and its disruptions, therefore, may refer to what Scott (1998, p. 20) calls “high-modernism” and its failure. Such failure mistakenly equates inexhaustible nature with the steady and certain conditions that should be created by infrastructure, an aspect of the “administrative ordering of nature and society” (ibid). Or, as Edwards (2003, p. 195) claims, the “chief characteristic of modern life-within-infrastructures” is “approach[ing] nature as orderly, dependable and separable from society and technology”. When the infrastructures fail, the natural “inexhaustible” condition of society and the environment appears. Therefore, Edwards further argues, “breakdown is a natural property of infrastructures, or instead is a property of nature as infrastructure (on which all human-built infrastructures ultimately depend)” (ibid.). In the next two sections, the breaking down of the power system in the Ancient Town will be treated as the critical moment, through which the redistribution of power on both the individual and the community level will be examined in detail.

6.3. Competing Infrastructure and Power Redistribution

As discussed above, infrastructure is designed to be transparent and the normalization process turns it into something taken for granted (see Sections 2.2 and 5.3). The electricity infrastructure is assembled by technological processes which elevate the power resources from their original forms and settings. When the electricity works properly, by the time it reaches its users (from the Marxist perspective), it is mere fetishism that treats energy as if it were the same as other commodities, which can easily be accessed by paying appropriate bills. However, when the electricity infrastructure fails to provide a normal service, it moves from the backstage into full prominence. In this section, I explore how the fragility of the infrastructure is unfolded when it functions improperly at the individual level and must meet the everyday competition between its active users. The

following discussion pays most attention to the way that the technologies and the users interact with each other, which then has an effect on the power redistribution between different users and also, between the users and the technology itself.

Using the Stabilizer: Small Technology Matters

From the story of the two guesthouses, we can see that what the business owners wanted most of all was a reliable electricity supply, in particular, at a stable and standard voltage. However, as we may have surmised from previous discussions, in order to reach satisfactory power conditions, many problems still had to be solved. In particular, when the issue was contextualized in a state-led tourism project and a non-communicable series of negotiations on electricity upgrading, numerous conflicts and contradictions were raised more than once but could never be overcome. Faced with this situation, the behaviour of the business owners showed nothing beyond the following two purposes: first, when power was scarce they had to try to protect their own electricity supply and minimize any negative impact; and second, they had to look for a new and effective way of communication, which could facilitate the laying of new electricity wires as soon as possible.

After following up the two years of competition for electrical power in Huangyao, I found that, although using the voltage stabilizer and upgrading the power system seemed to be the only effective approaches, they objectively helped the businessmen to achieve the two above purposes at once. To put it simply, when a momentary electricity cut occurs, the use of the stabilizer raises the voltage to a relatively stable acceptable level. In the Relevant Guesthouse, for example, the light bulbs could be observed to dim for a moment but after half a second to return to normal. The stabilizer constantly works in this way and this keeps up the supply of electricity consumed. Since generating and consumption of electricity are simultaneous, keeping up the consumption maintains the level of generation. Since the stabilizer is always at work, the current flow is always being intercepted. However, as noted above, “electricity boosting” adds nothing to the existing infrastructure for the town as a whole, but only ensures a temporary re-distribution of electricity to a specific house or street. The more guesthouses powered through stabilizers, the harder for each individual stabilizer to do its work.

Figure 24 is a schematic diagram analysing the principle of “electricity boosting” by the voltage stabilizers. This diagram illustrates the electricity network composition of

Tianran Street, that is, the street mentioned in the previous chapter with a figure of the route of the electricity wire. I should explain the premise which makes “electricity boosting” possible, that is, the proper environment in which electricity stabilizers work. This premise is that the power supply needs to remain somewhere between “absolute blackout” and “fully sufficient power supply”. In either a total power-cut or a fully sufficient supply, the stabilizer does not need to work, either because no-one is available to seek access to the electricity, or everyone can access it without limit. If there were no possibility of competition, there would be no need to talk about “boosting”. Therefore, the abnormal flow of electric power can be observed only when the voltage in the Ancient Town of Huangyao is unstable or is lower than it should be.

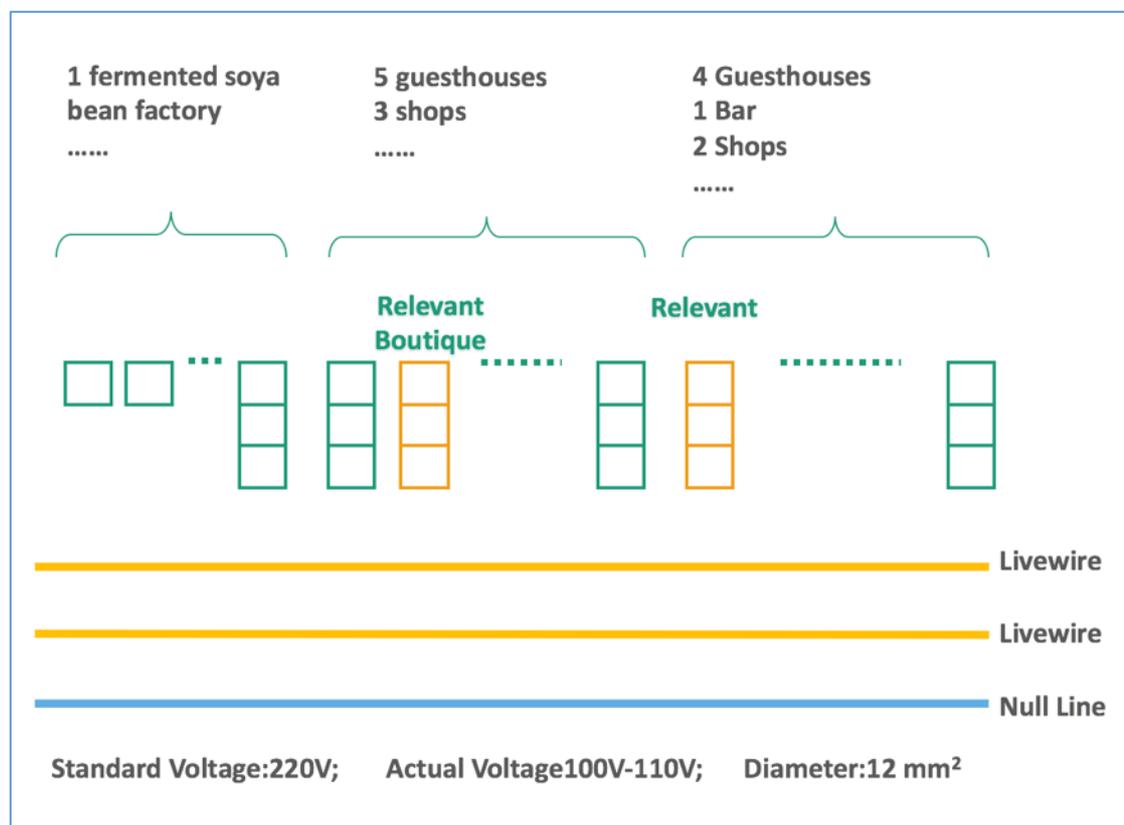


Figure 24. Schematic diagram of the original electricity network composition on Tianran Street. Note: (1) The first group of houses are mostly residential buildings where local residents live, except for one family workshop producing fermented soya beans which uses more electricity than the average; (2) the group of houses located in the middle consists of 5 guest houses and 3 shops. The Relevant Boutique Guesthouse is the second building from the left; (3) the third group of houses, on the right, consists of 4 guesthouses, 1 bar and 2 shops. The Relevant Guesthouse is the first building from the left; (4) the main electricity wire which connects all the houses mentioned in this diagram from left to right, consists of two livewires and one null line, 12 mm² in diameter. When the electricity supply is stable, the actual voltage conveyed by the main wire stays between 100V and 110V, which is half Voltage. Source: diagram produced by the author.

Whether or not the electricity can be accessed when the power supply is low/unstable depends mainly on two factors. The first is how much electricity is lost by the time it arrives at a certain point. This has much to do with the location of shops and guesthouses. Unlike other resources which can be stored or separated from their mode of transport or be stored, electricity is transmitted through wires. The generating, transmission and consumption of electricity all happen at the same time (Star, 1999; Gupta, 2015), which makes the materiality of electricity crucial in the competition discussed above. In the transmission process, although the resistance of the wire is very small, a certain amount of power generating/consuming will take place. Especially when the voltage is insufficient, the amount of power consumed by the wires itself becomes very significant. Thus, the location of a shop in terms of its distance from the power source becomes particularly important, since it reveals how much electricity is consumed in order for more to be consumed once it reaches a certain point. The second factor is the amount of current that the wires inside each house can carry. In order to make the electrical appliances work properly, the power consumed/generated must reach a certain level. Then, so long as the voltage is low or unstable, according to the formula $P=U*I$ and $P=U^2/R$, two basic electrical formulas¹²⁰, it can be reckoned that the electric wires of the electric appliances and the internal electric wiring of the house must have the ability to withstand higher current and, meanwhile, that every possible resistance must be reduced.

In criticizing the view that users are passive individuals determined by the technology or manipulated by influential inventors or marketers, Fischer's study on the early use of telephones in America put forward the "user heuristic" (Fischer, 1992, p. 269) approach. In his research, Fischer pointed out "user autonomy" by focusing on the way in which users adopt a specific technology according to their own habits rather than to the function of the technology as designed. From then on, researchers started to realize that the technologically systems could not be treated as immutable. Both the technology and its

¹²⁰ According to $P=U*I$, when P (the power) is constant and U (the voltage) is insufficient, I (the current) should be increased to achieve the set power (electrical devices function normally below a set power). This means that the electrical devices and circuit should be able to withstand the heat from a high current. In order to do this, when the Relevant Boutique Guesthouse was being renovated, it adopted, first, an inverter air conditioner which could withstand low voltage conditions of around 150V; second, the thickest electricity wires (the larger the cross-sectional area of the conductor, the smaller the resistance): according to another formula $P=U^2/R$, when P (the power) is constant and U (the voltage) is insufficient, R (the resistance) should be as small as possible to achieve the set power and reduce the power wasted on the electricity circuit.

uses are actively involved in and contribute to the changing process of the technology. From empirical studies which focus on the change of a certain kind of technology, Furlong observed that simple and low-cost small devices “can be added to an infrastructural network with the intention of modifying its performance” (Furlong, 2014, p. 460), which clearly challenges the perception of a stable infrastructure and “evince[s] the potential malleability of infrastructure networks”. One step ahead, Anand (2015) expanded the notion of “small technology” from technological devices to the co-working of these and human beings. The studies of technical strategies and the politics of small-scale modifying, such as the maintenance and repairing of infrastructure, provides a “situated account” (ibid., p. 308) of infrastructure in a lively and concrete environment. The study emphasises that the efficacy of the water engineers “depended less on measurement-enabled interventions and more on actively negotiated, informal technologies of repair” (ibid). The maintenance work documents the “materials and histories” of the infrastructure in a particular location. All these studies drew my attention to specific technologies, strategies and negotiations between subjects in a concrete situation. They form the starting point for investigating what constitute the unstable and contingent nature of infrastructure.

Electricity Boosting: Forming the Liminal Space

The circuit design used in the construction of the Relevant Boutiques met the requirements¹²¹ mentioned above. At the same time, as by **Figure 24**, the Relevant Boutique Guesthouse is located on an upper stream of the main electricity wire of Tianran Street (less electricity is consumed by the transmission wires). Before the electricity arrived, there was only a fermented soya bean workshop and one guesthouse which needs electricity as much as the Relevant Boutique does. Therefore, judging from the inherent conditions¹²², the Relevant Boutique is at a considerable advantage. It was not so lucky that the Relevant, whose internal circuits were built a decade ago, was located further

¹²¹ As described above, the wires used inside the Relevant Boutique Guesthouse have a large cross sectional area, which means they have lower resistance and can withstand the higher heat generated by strong currents.

¹²² Although the internal circuit design of the guesthouse came into being through the guesthouse owner’s efforts, in general, once the guesthouse is completed, the circuit design will be regarded as an established factor which cannot easily be changed. Therefore, here, the quality of the internal circuits and the location of the houses are both counted as inherent condition,

downstream. Then, except for awaiting their doom, what strategies can be recommended for the shops and guesthouses that have already been completed, including the Relevant Guesthouse¹²³, when electricity shortages ensue?

First of all, owners should reduce the necessary voltage setting of their appliances, such as the variable frequency air conditioner. With a normal power supply, this kind of air conditioner is designed to prevent unnecessary energy consumption. However, in Huangyao, “saving energy” is not optional. Second, as noted above, each of the guesthouses needs stabilizers or regulators. A regulator is like a gate standing between the main line and the internal circuit, regulating the input voltage in order to guarantee the stability of the power consumed in the guesthouse when power is passing through it. Since the electricity works in a complete cycle, consumption and supply are concurrent and affect each other at the same time. Therefore, the more stable the use of electricity, the smoother the input will be. In other words, the use of the electricity stabilizer allows one house to consume more electricity than another which lacked this protection.

The strategies for electricity boosting mentioned above actually increase the consumption of electric power at each node (house), but none of the strategies has fundamentally improved the level of electrical power that the main wire on Tianran Street could withstand. In other words, when some nodes get more constant power supply, the others will have weaker access to the main electricity wire. In the same way, if the main wire on Tianran Street is considered a tributary, it shares the higher level main wire on New Street with some other tributaries in Huangyao. Moreover, in addition to the fact that electrical energy itself does not have a physical form as other energy sources do, electricity is generated, consumed and transmitted simultaneously. Therefore, the use of the boosting strategies described above actually allows electricity to be redistributed at every moment among all the nodes connected by the same wiring system.

The political nature of the electricity infrastructure had moved to the front of the stage by the time the “boosting” began. The action of “boosting”¹²⁴ is nothing other than

¹²³ Although the Relevant Boutique has better inbuilt devices, it still has to join the competition when electricity shortages occur.

¹²⁴ The word “boosting” has been used to replace “stealing” in previous versions of this thesis. The reasons for preferring this word are, first, that it emphasises the “improvement” on a local level, although no electricity is boosted everywhere on the same level; second, it emphasises the “redistribution” of electricity;

appropriating a source of public energy to private use. However, it is different from the common understanding of thieves getting a fortune without paying for it. In fact, the “winners” in the competition for electric power have to pay for the amount of electricity they use and also to spend money on stabilizers and other electrical improvements. However, this distinction does not account for the whole story; when people “boost” their domestic electricity, what are they actually doing? In other words, for the “winners” of the competition, how different is the situation from the time when there was no “power boosting”? Boosting is something developed naturally and the power redistribution has been the effect of the “unintentional competition” to achieve “informal local improvement” under the existing infrastructure system. The words “naturally” and “unintentional” refer to the fact that although the users had no thought of changing the entire system the change and redistribution actually happened. So my use of the word “boosting” here means that I want to emphasise that certain resources were redistributed without the acknowledgment of the infrastructure system or any official confirmation or permission from the “normalized order”. Actually, the “normalized order” shaped by the infrastructure had already been broken when the users became aware that they would have to “make” and “do” their domestic electricity. When it comes to inadequate electric power the original “paying” and “buying” action to get electricity no longer works. Since the appliances (electronic devices), the transmission (electricity wires) and the generation of power are all enacted at the same time, it is hard to separate the “possessing” from “using” of electricity.

In the above way, “infrastructures constitute society” (Edward, 2003, p. 190). No variety of social order pre-exists the infrastructure and, by the same token, the reconstruction of the infrastructure, is in fact the redistribution of the social order. What inspiration can we get from the “contestable” nature of infrastructure which leads to a further discussion of the constant re-ordering and “re-patterning” claimed by Kallianos (2017), as a condition

third, it would be good to avoid invoking a moral judgment by using a non-neutral word such as “stealing”. I would also want to clarify that the users of stabilizers do not use either “boosting” or “stealing” to describe their behaviour. But it is obvious that by using a word such as “Gao (搞)” and “Nong (弄)” (the most common Chinese verb for “doing”), in connection with “the thing of electricity”, the users have an awareness of “doing” (and even “manipulating”) electricity instead of merely “using” it or just “paying” the bills. Like the “leakage” used by Anand (2015), by using “boosting” instead of “doing”, I want to emphasise that something is going on which is more than simply “doing” something in regard to electrical activity.

of the state of being? It “develops in the liminal space between the planned and the contingent” (ibid., p. 2). Like the re-patterning led by the “boosting” of electricity, it is “neither completely embedded in the system nor are they entirely external to it” (ibid). Instead, the contingency of infrastructure, such as the re-patterning, emerges from the infrastructure and functions through the infrastructure. The most important thing is that even though the electricity boosting was not a constitutive part of the initial design of the electricity infrastructure in the Ancient Town, it gradually became “formative of everyday infrastructure experience(s)” (ibid). No-one who discusses the electricity conditions in Huangyao can ignore the competition for electricity and the action of boosting.

As a result, the boundary between formal and informal practices is not fixed, but rather mutable and negotiable. Within the liminal space created by this re-patterning, relevant stakeholders, the users in the case of Huangyao, have developed their own effectual ways of dealing with both the unstable infrastructure and the consequent uncertainty. In the next section, the discussion focuses on the way in which the effect of electricity boosting goes beyond the individual level and “organises” the discussion on the community level.

6.4. Making the Participatory Electricity Infrastructure

This section asks whether material entities, such as electricity wires and appliances, render public engagement possible. In the case of Huangyao ‘s competition for electricity, the adoption of electric facilities, such as those provided by the voltage stabilizer and thicker wires, extended the discussion of power access from the private realm to the public sphere, which then assisted the power redistribution within the local community. No endorsing the popular view that technologies, commodities and technological commodities have a negative influence on the forming of community, this research explores how technologies get the capacity to organize a public discussion on the subject of the electricity infrastructure.

These observations on the electricity contest are in accordance with what is called “the object turn” in social, cultural and political studies. The object turn is not only about announcing the importance of objects which had been neglected in previous research. In fact, these studies focus on, for example, exploring “the capacities of things to facilitate, inform and organize citizenship and engagement” (Marres, 2012, p.7), or the political form “in the language of technology itself” (von Schnitzler, 2013, p. 687). In contrast to the idea that materials and objects cannot be made to engage and participate, what is

emphasised here is that material entities do make an important contribution to organizations and communities which is usually considered a purely human expertise. In other words, it is about the way that participation is materialized in the form of objects and asks what specific roles the object plays in the enactment of public action?

I start the discussion by examining the materiality and quasi-public/private nature of electricity infrastructure, which is a continuation of the “two commodities” argument of electricity (see Sections 5.2 and 5.3). Then the discussion moves to a process analysis of the way that the public’s engagement and negotiations between community members are expressed by means of electricity. There is the inseparable relationship between the human users and the electricity hardware that produces a participatory electricity in discussions of electricity upgrading, through which a techno-political terrain based on participatory electricity is formed.

Quasi-Public/Private Infrastructure in a Local Perspective

It is reviewed in chapter 5 that the rapid development of the power industry in the private sector in its early stages, did not result from the nature of the power industry itself (see Section 5.2). Instead, it was the American businessmen who institutionalized electrification as a commodity that gives us the impression that electricity was born and stays close to the private sector. Similarly, before and after the power industry reform in China in the late 1990s, electricity appears as both a substantial commodity and a formal commodity. Neither of the above features is determined by the nature of electricity. Inspired by the ambivalence of electricity, the research seeks to explore whether electricity has the capacity to stand as the link between the public and the private sectors. Some clue may come from the individual action of “electricity boosting” when the electricity supply is insufficient to meet the power requirements of the community.

As noted in the previous section, the lucky location of the Relevant Boutique Guesthouse, and the great effort invested in renovating it made the Relevant Boutique do its best to obtain electricity from the main electricity wire. With the help of a voltage stabilizer, it suffered less inconvenience than many of the other guesthouse owners. All its technical advantages gave it higher capacity to offer better electricity. Besides the technical basis that favours it in competing for electricity, it takes advantage of one precondition that allows “electricity boosting” happen on an individual level without receiving peer pressure from the community. In other words, it would be hard to accept electricity

boosting based on the individual if the electricity functioned as a substantial commodity which was deeply embedded in other social institutions. As the shop owners noted, however, since their electricity bills cover their consumption of electricity, the owners are free of moral pressure. It should be noted that, during the rural power reform, one of the specific measures of transformation was to install an independent electricity meter for each user. This reduced the contradiction caused by power sharing and thus achieved the purpose of encouraging electricity use. The electricity bill, which was mentioned by the shop owners, is calculated from the electricity meters, which then allow the “electricity boosting” to continue.

The meter, which works as a very important device in the research of infrastructures, has received attention from scholars in various fields. By comparing the use of electricity and central heating, Hinchliffe points out that the users of electricity (with a meter) are offered more “consumer sovereignty” (Hinchliffe, 1996, p. 666) than are users of district heating, which is not equipped to show individual meter readings. “Consumer sovereignty” comes from the use of electricity meters, which function as an “unequivocal spokesperson”¹²⁵ for both sides, the electricity company and the user. Hinchliffe elaborates how the spokesperson functions, as follows:

“Electrification, in conjunction with the meter, was a political technology, constructing or stabilising spaces which worked rather effectively around a dichotomous divide between inside/outside and resonated with a liberal disjunction between individual and society” (ibid.).

The installation of an electric meter is like the installation of a gate, which clearly divides the responsibility between inside and outside. The reading on the meter represents the responsibility of an individual user. The responsibility is quantified and undertaken by paying regular bills on time. Therefore, the world outside the meter is neither within the control of the users nor part of their duty. As Hinchliffe argues, “electrification [was] a process which, through its sociotechnical translation, enabled an intensification of individualism” (ibid, p.665). This example also proves that the infrastructure system,

¹²⁵ The “spokesperson” is cited by Hinchliffe from Akrich (1992). The original work argues that the electricity company negotiated with a spokesperson rather than directly negotiating with the village where the electrification was going on.

encapsulated in the electricity meters, acts as a socio-technical system/device, which “fostered a wider definition of the concept of citizenship” (Akrich, 1992, p. 216).

For this reason, the shop owners could easily justify the action of electricity boosting and put as much effort as they could into making it easier to consume more electricity. But it is also this liberalized use of electricity that reveals the extent of further negotiation through electricity. From the discussion on the individual level of electricity boosting, we see that the “consumer sovereignty” provided by the electricity meter is conferred at the crucial moment, when the electricity infrastructure begins to have the attributes of both public and private space. In this situation, the infrastructure becomes negotiable even by coping strategies, such as “electricity boosting”. The instability and contingency of the infrastructure is revealed in different conditions and by different actions of individual users. In fact, “apolitical appearance” lurks behind such a dynamic precisely at the moment when the infrastructure system functions properly. It is the time to rediscover the political infrastructure during negotiations.

The story concerning the electricity competition in Huangyao opens up a quasi-private/public attribute of the electricity infrastructure. When the electricity supply is sufficient, electricity is considered a more or less formal commodity (see Section 5.3) accessed through the payment of regular bills. People who share the same electricity infrastructure have the same chance to access it. In normal circumstances, the more electricity one uses, the more one pays. But no matter how much one uses, it should not hinder the use of electricity by others. The use value and electricity as a public attribute lurk in the background, as a substrate. On the contrary, when the electricity supply is insufficient, which is the current situation in the town, the more electricity one user gets, the less other users can get. In this situation, electricity has become a finite resource. Since there is no “powerful regulator” comparable to the administrative regulation of the planned economy era and individual users have their “proper justification” in the way they use electricity, competition begins between the users of electricity. Each user has different circumstances; for example, the location of the house, the varying quality of the internal electricity wiring, different times of peak electricity use according to service differences, different financial conditions regulating how much extra money one can spend for extra equipment, etc. All of these produce individual attitudes and strategy in the competition electricity.

Materiality Matters and Infrastructure as a Socio-technical System

The question whether electricity is a kind of common resource shared by the community or a commodity that may be liberally consumed by individuals is the entry point to discussing the provision of participatory electricity. It is widely accepted that since the infrastructure system is technologically standardized and even globally integrated, it must be provided with a certain stability and permanence. However, instead of treating the infrastructure systems as a stable system providing public resources, as most people believe, some scholars from the beginning questioned this common understanding when the infrastructure was assembled. The small, fragmented technologies from which the infrastructural system evolved should not be eliminated, especially when considering how the systems function. It has been noted that, just because of the apparent permanence of black-box infrastructural complexes (Graham, 2010), the infrastructure networks retain powerful images of stability and permanence. If we go back to investigate subsystems or the subsystems of the subsystems, things may be different from what we imagine. Usually, infrastructure systems are regarded as “symbols of the complexity, ubiquity and the embodied power of modern technology” (ibid., p. 8). This explains why people still use language such as “public infrastructure” or “public networks” to describe infrastructure in everyday life, without paying enough attention to the inevitable contingency hidden deep behind.

If we see such questions through their social and historical perspectives, we may be able to detect the contingency of the process through which the infrastructure originated. By rejecting the determined nature of technology, Hinchliffe argues that “utilities combined and merged in ways which tended to maintain, rather than erase, the mixed and local character of the system” (Hinchliffe, 1996, p. 663). It suggests that only when we treat the infrastructure from a local perspective can we catch the contingency of infrastructure. Rather than treat the infrastructure as an instrumental system that functions according to a pre-existing order, the time and space conditions of the infrastructure must be taken into account. In other words, the installed bases matter to the further functions and further reconstruction of the infrastructure itself. Further than emphasizing local conditions, including the time and space which conduced to the formation of the infrastructure, the material base of the infrastructure itself indicates that the construction of the infrastructure did not start from nothing, but rather from a series of strengths and limitations of the already existing base, including the parts and fragments of the infrastructure itself.

Instead of arguing about why electricity equipment has the capacity to facilitate negotiation, which goes on to an ontological enquiry into tool power, it is better to first take a look at the way in which the equipment, apparatus and devices acquire the capacity to organize public services by particular means. It is about the way in which “participatory objects” (Marres, 2012) work. In the case of Huangyao, the question that should be specifically asked is how electrical devices acquire the ability/agency to mediate public involvement.

For the marginal users of a particular kind of infrastructure, or for those who have been disconnected, such as the users who have no access to stable electricity within the Ancient Town, the problems of infrastructure do not stay within the technological realm. In these cases, “improvisational capabilities to deploy backup facilities or coping strategies when main networks collapse tend to be well developed” (Graham, 2010, p. 9). In the case of Huangyao, the improvisational capability or coping strategy shows up in the form of electricity boosting. By boosting the electricity, business owners make visible themselves and their appeals. “Boosting” becomes their way of showing their existence, in order to negotiate with the existing system and even to make some changes.

In the context of the existing electricity system, equipping the guesthouses first with adaptable electricity devices to withstand low voltage situations; second with better electricity wires to reduce the power loss; and third with extra devices to boost electricity, are in some ways the coping strategies adopted by the individual shop owners to negotiate with the existing electrical condition. As clarified above, from the perspective of the shop owners, the “boosting” action results from their reasonable demands for electricity, which unfortunately, do not fall in the acceptable range of the present normalized electricity conditions in the Ancient Town. Their demands fall beyond the existing system. Hence, they have to deal with the limitations provided by the existing base. It has nothing to do with a moral judgement of the action of “boosting” and we cannot say that what the outsiders are doing is fallacious. In fact, after the rejection of other ways to reach agreement on the upgrading of the electrical infrastructure, electricity boosting” has become the only way to get electricity without damaging the whole system yet further. When they engage in “electricity boosting”, the “outsiders” materially intervene in the existing system and show that it has to change due to the series of unstable and uncertain attributes of the infrastructure. The business owners want to upgrade the electricity system to a new level. But, before the new stage is reached, “electricity boosting” has

become both the way to survive and the material channel of negotiation. It is a kind of participation through electricity, or we could call it the making of participatory electricity.

By the same token, local residents' impassive reaction to the new electricity system also expresses their reasonable appeals. The new electricity system is not what the local residents mostly wanted. And, although they suffered from an unstable electricity supply and blackouts as the business owners did, they were not mainly concerned with the condition of this power supply. In the case of Huangyao, the local residents' failure to participate has become their way of occupying the infrastructure and showing their resistance, facilitated by the resistance in the thin wires of the infrastructure itself. By not doing anything, the local residents make their appeals visible also through the electricity system. In fact, this intentional ignoring of the upgrading intensified the instability of the electricity system, which objectively contributed to the collapse of the existing electricity system and the formation of a new one. Therefore, their non-participation was also an important element in the making of participatory electricity.

Localizing the infrastructure highlights the importance of the material entanglement with particular interests, located in domestic life and the private sphere. In classical political theory, actors with these interests are incapable of participating in public discussion until they can disentangle themselves from those everyday material concerns (Marres, 2012). However, in recent years, political studies, looking for other possible locations, has taken a material turn by pointing to the importance of materiality in the constitution of political actors, of political engagement and of the location of political action which are "often below the threshold of visibility of [the] normative conception of political action" (von Schnitzler, 2013, p. 672). As discussed above, it is the "electricity boosting", located in the private sphere, that opened up the public attribute of electricity to inspection and negotiation. Here, political questions and conflicts are materialized within the technology, which forms a "techno-political terrain" (ibid., p. 687) inscribed within the infrastructural devices. Therefore, we must not deny the public capacity of the action extended from the private realm in a material form. Such action is mediated by material forms of action, such as electricity equipment.

6.5. Setting up the New Line: The Empowered and the Repressed?

Based on the political nature of the infrastructure discussed in previous sections, we can now say that, without the support and the maintenance of technological and political

systems, infrastructure systems are precarious social and technological achievements. Precisely resembling what we have discussed in the everyday competition for electricity in Huangyao Ancient Town, the infrastructure systems in the global south, are far from everyday black-box “stable” instruments. Instead, infrastructure is made of “highly politicized assemblages of artefacts and practices” (Graham 2010, p.10) and according to the users’ appeals and efforts, the most likely aspects to be changed and improvised upon are the ways in which the infrastructure functions. Sometimes, by adopting certain devices, people can receive more resources than they were intended to receive; but at particular moments, the infrastructure system itself may become a political weapon.

“The space of the city, orchestrated by the organizational logics of infrastructure, is precisely revealed in its destruction” (Graham, 2010, p. 25). When powerless individuals, such as business owners and local residents compared with local governments and developers, are faced with a complex infrastructure system, intentionally/unintentionally damaging the infrastructural circuits sometimes becomes a possible way for political participation to amplify the hidden social relationship. Breaking the infrastructure is perhaps the ultimate way to forcibly “un-blackbox” the infrastructures that have managed to be granted the status of perceived stability and domination. When the diverse actors are properly tied up beside each other and collaborate according to their allotted roles within a formed infrastructural network, the network then becomes stable for a while and lurks in the background. With new appeals and the emergence or influence of new figures in the system, new “un-black boxing” will occur, which is then followed by renewed competition to a new stage of existence as a black box. In this section, by recording the phased outcome of the competition for electricity in the summer of 2016, that is, the partially upgraded electricity infrastructure, I go on to discuss the empowerment and the repression resulting from the competition for electricity.

As noted in Section 6.2, more than 300 power cuts affected Tianran street during 2016, the longest of which lasted up to 15 hours according to Li, my interviewee, who owned one of the guesthouses. Led by Li, a total of 83 business owners presented a petition to four departments related to electricity upgrading in the summer of 2016¹²⁶. As expected,

¹²⁶ The petition contained two main appeals: the first one asked Huangyao Ancient Town Cultural Tourism Ltd. (HCTL) to provide discount tickets (see Section 4.4) for the tourists who were staying in guesthouses in the Ancient Town; the second one asked the relevant governmental departments to solve the problem of the power supply as soon as possible. The four departments (including the Tourism Company HCTL) who

this petition failed to improve the situation. Ironically, shortly after this petition, a blackout took place that took the long-standing situation one step forward by upgrading the electricity wires within the Ancient Town.

At the end of July 2016, Hezhou City hosted an important national summit on tourism development in Huangyao Ancient Town¹²⁷. According to the guesthouse owners on Tianran Street, it was a very hot summer weekend and the Ancient Town was filled with tourists, online celebrities¹²⁸ and governmental officials. Almost every shop owner had already predicted that a serious blackout the same evening would be unavoidable. For the people who had become experts in the unstable and contingent electricity infrastructure, such as the shop owners in the Ancient Town, the hot weather plus the tourist peak at weekends would unquestionably lead to the overload and blackout of the electrical infrastructure. However, for the people who had never lived with this experience, such as the governmental officials and the online celebrities, it must have been hard to imagine how the electricity could breakdown during an important event like this in a well-known and well -developed tourist site.

From the perspective of the people who had been suffering from the electricity shortages and expecting an electricity upgrading for years, a comprehensive blackout during the event might not have been considered a bad thing, although it might have negatively affected the reputation of the Ancient Town. As expected¹²⁹, the electricity system of the town broke down on the Saturday evening. One hour later, since there was no evidence of any chance of having it restored, the tourists started to check out and ask for refunds. In Li's blog he said that every time when there was a blackout, the same things happened as if written into the script: "I would first call the Town Administration of Power Supply to report the blackout; then the tourists would flock to reception with complaints and

were responsible for this two appeals included the Guangxi Huangyao Ancient Town Tourism Culture Industry Area Management Committee (HTIMC), the Huangyao Town Government (HTG), the Town Administration of the Power Supply (TAPS) and Huangyao Ancient Town Cultural Tourism Ltd. (HCTL).

¹²⁷ A national summit named "*V Impact of Tourism*" was held in Huangyao on July 26th, 2016.

¹²⁸ Online celebrities are online bloggers who are famous for tourism. They are either attracted by an event, or invited by an event holder to attend.

¹²⁹ This narrative of the power cut at the end of July 2016 is mainly based on 1) my interview with Li, the guesthouse owner, in March 2017; 2) the WeChat blog *That Blackout Night, I & II*, published by Li on 5th August, 2016.

asking for refunds; and at the same time I would repeat the same lines that had been repeated countless times.” However, the script was altered a little since some tourists told him there were governmental officials in Huangyao Theatre¹³⁰. This information spread very quickly around the small town. Guesthouse owners started to gather in front of the theatre to express their dissatisfaction and to see if there was any chance of appealing for help to higher level officials. At this time, governmental officials from Hezhou prefectural city were watching a rehearsal of the summit opening. Guesthouse owners were stopped and questioned by staff in front of the theatre. Before they actually got the chance to see the City officials, the electricity supply recovered and they went back to “celebrate”.

Those who gathered in front of the theatre had no chance to discuss the issues around the electricity shortage directly with the Hezhou city leaders in return, but it did give some the opportunity to spend a night in a police station and to talk to Zhaoping county officials the next morning. Li describes four representatives of the group now forming were taken to the police station at 3 am and questioned separately by the police officers¹³¹. At 8 o’clock in the next morning, Li and the three other representatives were told that Zhaoping county officials wanted to see them. At 10 o’clock, they were moved to the meeting room of Huangyao Town Government, where three county officials and one town official, namely, the Deputy County Magistrate, the County Political and Legal Committee Secretary, the County Commissioner of Public Security and the Town Secretary, were already waiting. During the meeting with the County officials, it was promised that Town Secretary would be responsible if any power cut occurred in the future¹³². Two days later saw another blackout, after which the above script was repeated. Two weeks after this, the director of the Town Administration of Power Supply was

¹³⁰ Although Huangyao Theatre is in the very middle of the Ancient Town, it did not experience a blackout this time, since it has a dedicated power supply, whose electricity wiring is directly connected to the main line on Gejiangshan Street.

¹³¹ Questions such as “Who told you to come to the theatre?” / “Who else participated in this gathering?” / “How did you know that Hezhou Prefectural city officials were at the theatre today?” were repeatedly asked by the police officers.

¹³² According to the narrative of Li, during the meeting, the Town Secretary told Li his mobile phone number and said that if any blackout happened in future, Li could contact him directly. The ticket prices (see Section 4.4) in Huangyao Ancient Town were also discussed at the meeting. However, it ended without agreement. Li and the other three representatives hoped to get some discounts for the tourists who were staying in the guesthouses of the Ancient Town. However, the County officials said that they were planning to raise the ticket prices from 100 RMB to 200RMB.

dismissed and so were the County leaders who had been responsible for the tourism project.

At the same time, a new electricity wire was set up to connect Tianran Street and Yingxiu Street with the main electricity wire. However, it was different from the original upgrading plan, which had aimed to replace the old electricity wire on Tianran Street with thicker wires. As shown in **Figure 25**, below, the green line on the left was kept as before. The houses connected by the green line were still sharing the old electricity wire. The new wire, which is drawn in purple, started from the south entrance of the Ancient Town and connected the shops and households on Yingxiu and Tianran Streets. According to an officer who worked in the Tourism Culture Industry Area Management Committee (HTIMC), the new purple line was a dedicated line in power supply, enjoying the same importance and priority as the Huangyao Theatre had. If we look at **Figure 25** and **Figure 26**, in fact, the layout of the new line is to some extent, in accordance with the appeals expressed by the rivals for electricity Households which connected to the green line, however, did not agree with the electricity upgrade. From **Figure 26** we see that, after the upgrade, although people on the west part of Tianran Street are still using the old wire, they have got rid of the burden of the East part of Tianran Street and they do not have to compete for electricity with the guesthouses, either. The shops on the east part of Tianran Street and Yingxiu Street are now connected with a new main wire as they were promised.

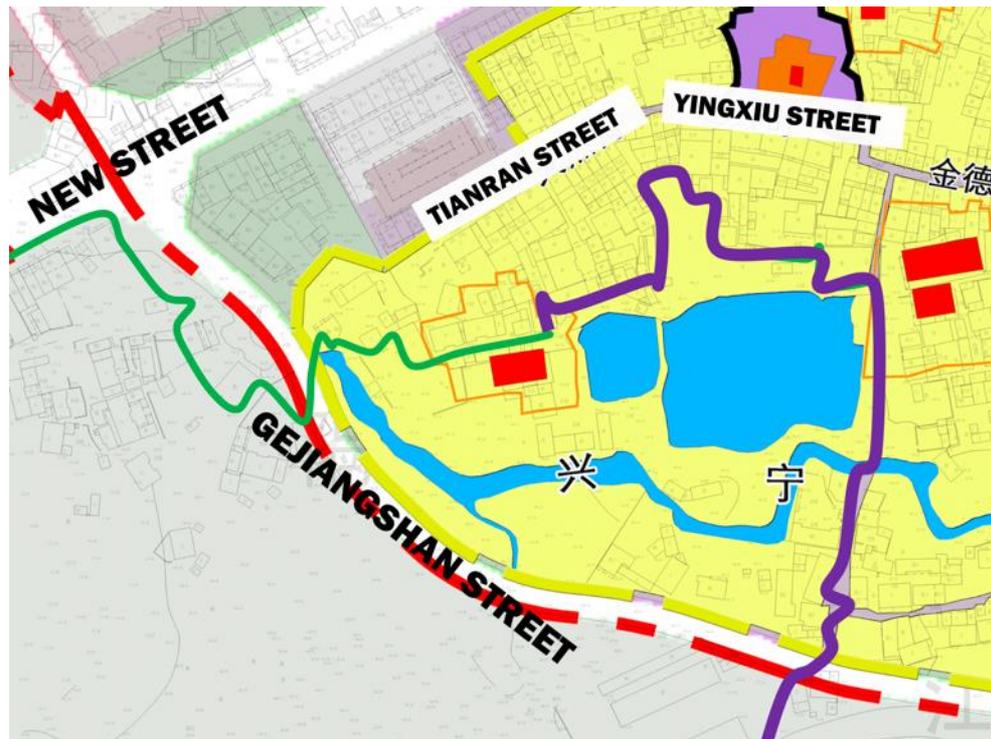


Figure 25. Map of the west part of Huangyao Ancient Town, coloured in yellow. *Source:* map credit by the Construction Control for protecting the Cultural Relics of the Master Plan of Huangyao Town, Zhaoping County (Shanghai Tongji Urban Planning & Design Institute, 2012, p. 29) and the electricity delivery route. Drawing as well as English labels by the author.

Notes: (1) New Street and Gejiangshan Street are labelled as the outskirts of the Ancient Town; Tianran Street and Yingxiu Street are labelled within the Ancient Town; (2) the green and purple lines indicate the route of the low-voltage transmission wire which connects each household on Tianran and Yingxiu Streets with the main electricity wire on New Street. Households on the left of this map are still connected to the main wire (on New Street) through the old electricity wire, which is coloured in green; households on the right of this map are connected to the main wire (on Gejiangshan Street) through the new electricity wire, which is coloured in purple.

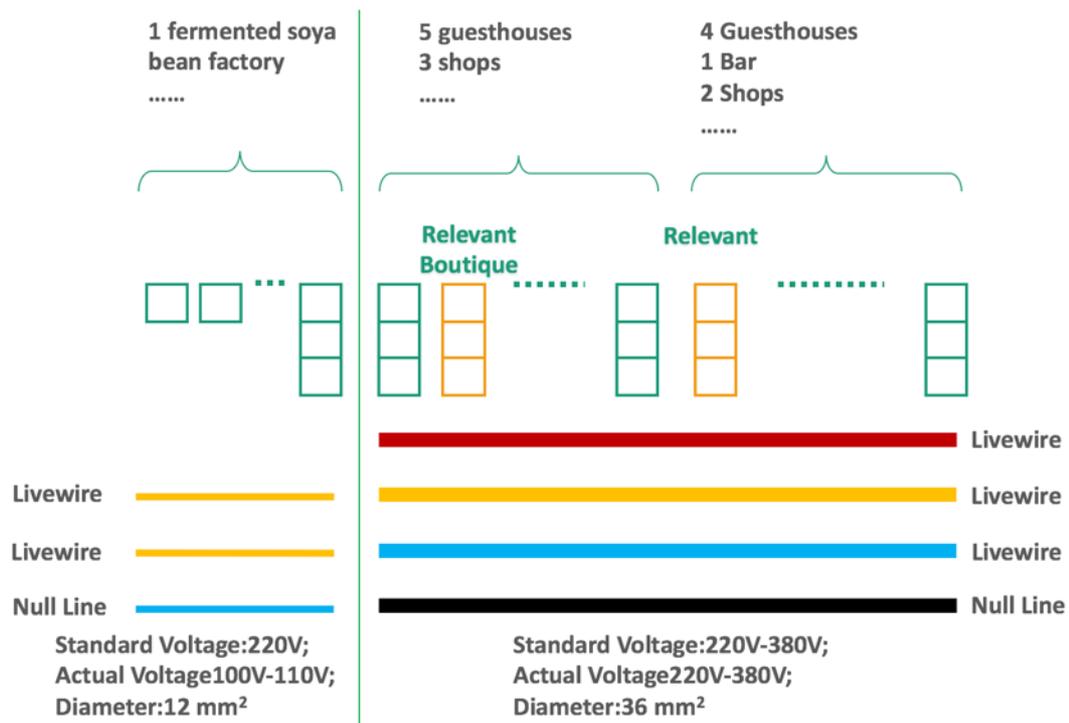


Figure 26. Schematic diagram of the updated electricity network composition on Tianran Street. Note: (1) The first group of houses are mostly residential building where local residents live, except for one family workshop producing fermented soya beans which uses more electricity than the average. The main electricity wire which connects the first group of houses is still the same as that before upgrading; it consists of two live wires and one null line, 12 mm² in diameter. When the electricity condition is stable, the actual voltage conveyed by the main wire stays between 100 and 110V, which is half Standard Voltage; (2) the group of houses located in the middle consists of 5 guest houses and 3 shops. The Relevant Boutique Guesthouse is the second building from the left; (3) The third group of houses on the right, consists of 4 guesthouses, 1 bar and 2 shops. Relevant Guesthouse is the first building from the left; (4) the main electricity wire which connects the houses in the middle with the right-hand group is the upgraded one, which consists of three live wires and one null line, 36 mm² in diameter. In normal conditions, the voltage conveyed by the new main wire stays between 220V and 380V, that is, the standard industrial and household electricity voltage. Each household/shop selects two of the three live wires to connect with, which significantly reduces the load on each live wire during peak hours. Source: diagram produced by the author.

Through the electric devices used in everyday life, the business owners initiated the competition for electricity, which provided a channel through which to participate in the tourism project and to make their appeals successfully. The story of the electricity conditions in Huangyao Ancient Town has by now reached a new stage, but still has a long way to go. From the perspective of the electricity infrastructure itself, even though the main wire on Tianran Street has been upgraded and – almost at the same time – the

Huangyao 110kV substation has been connected to the Jiangkou 220kV substation¹³³, it could not be guaranteed that the electricity supply to the entire Huangyao region would be unrestricted or even sufficient. Since both social and technical control are central to the question of electricity and the grid in general (Cohn, 2017), the business owners in Huangyao could use the electrical devices to campaign for more use of electricity while others did the same and the power supply companies could also control part of the grid as their other concerns demanded. We see that power cuts still dim Huangyao Ancient Town during the peak season¹³⁴. The current result once again makes it clear that any discussion about infrastructure goes far beyond matters of infrastructural hardware.

Moreover, what should not be ignored is the difficulties in wait for the competition for electricity if it tries to present itself as a participant in the decision making process or shake the dominant role played by the local state in developing tourism projects. Although the competition for electricity originated from the local community, it had no direct effect upon the problem. Eventually, it was an order from higher authority that pushed forward the electricity upgrade. By upgrading the electricity hardware and dismissing/relocating some low-ranking cadres, the state-led tourism project has maintained its own legitimacy. The nature of the state-led tourism project as a valuable resource contributing to the local state's "Rise of the Green" strategy, has not been touched. The competition for electricity and the general construction of infrastructure then become questions of governmentality, concerning the conundrum of distributing agencies to technologies and the local community depending on specific designs and contexts.

6.6. Summary

In this chapter, the discussion is based on the investigation of the competition for electricity initiated by individual business owners in Huangyao Ancient Town, during a period of electricity cuts. From the perspective of heavy users, such as the guesthouse owners whose businesses depend heavily on modern networks of infrastructure, the disrupted infrastructure has become their everyday concern. Therefore, the electricity

¹³³ The Huangyao 110kV substation was completed in June 2013. However, it took another three years to connect this substation with the higher level Juangkou 220kV substation owned by Hezhou Power Supply Bureau.

¹³⁴ According to Li's record, blackouts are still occurring since the upgrade.

infrastructure itself, for the first time, appears at the front of the stage of everyday tourism-oriented services. It must be maintained by additional infrastructural devices; otherwise, it must be replaced by some self-sufficient energy provider, which is not at present technologically or economically available. Based on previous discussion in Chapter 4 and 5, because of the non-communicable power upgrading of all the relevant actors, the electricity shortage could not easily be resolved in the context of a state-led tourism project. As a result, the precarious electricity conditions have become a condition that business owners have to live with and also the only possible way to seek any change.

By using a certain kind of electrical device, the voltage stabilizer, active users initiated “electricity boosting” strategies to “maintain” and, at the same time, to “repair” the precarious infrastructure. To maintain it meant that, with the help of small technologies, business owners were able to protect the normal operation of their business as much as possible from being destroyed by the disordered infrastructure; to repair it meant that the appeal for improvement from the users materialized and spread through both the wiring and the small electric devices in the form of power redistribution. With the application of small technologies, the existing ways of electricity distribution were gradually re-allocated and the unstable and contingent nature of the infrastructure was exposed to view. The competition for electricity formed a liminal space and the infrastructure itself turned into a political terrain (Schnitzler, 2013) upon which political questions could be and were raised, discussed and negotiated. In other words, political participation circulated and manifested itself in the material forms of the infrastructure being constructed.

Noting the importance of materiality in the constitution of political actors and of political engagement, this research further argues that electricity infrastructure has the capacity to facilitate and organize a less visible and non-traditional public view of infrastructure. Political disagreements and conflicts which often concern central political questions in everyday life are brought to light by the infrastructure, which at the same time is also the place where the negotiation and problem solving occur. Through the competition for adequate infrastructure, when it enters the public sphere and facilitates political discussion, the importance of entangling the material with domestic and private interests has been highlighted. In this research, the political dynamic between a local community and a state-led tourism model has been articulated in segregation (Chapter 4). However, the two parallel bodies clash in the competition for electricity and the upgrading of infrastructure. Chatterjee’s “political society” (2004) enables us to rethink the locations

of the political, which is located not only in what is conventionally thought of as the political sphere; on the contrary, it is in the places where rules may be stretched or not even have been set up that political questions are often de facto negotiated and resolved.

Compared with the sharing of infrastructure discussed in the two previous empirical chapters, electrical infrastructure in this one speaks with a louder voice. It is not a mere physical articulation of either existing or future social relations, but plays an active role in re-organising social relations. When individuals find alternative strategies, such as using a voltage stabilizer, it is a form of stress reaction, drawing on the existing infrastructure to surmount obstacles which are supposed to be insuperable. The alternative strategies for using the existing infrastructure with additional electric devices are expedients for solving contingent problems rather than comprehensive plans drawn up by the users. When people adopt such strategies, they are not even sure that they will work, and they are also uncertain how long the strategies will suffice. When they have to deal constantly with infrastructural problems, the infrastructure now at the front of the stage turns them into infrastructure subjects, who work and live in the light of a system of unpredictable technical objects.

From the back of the stage to the front, this is a good image from which to grasp the relationship between the human actors and technical objects. What brings the infrastructure from the status of substrate to a stage at which it raises the awareness of its human users? What transforms the unstable infrastructure into something that human users have to follow, and that influences the everyday lives of the human actors whom it connects with one another? However, even when we use such verbs as 'influence' and 'connect', we are still assuming that infrastructure is a passive entity, composed of dead matter, which is external to the environment that it constructs and is being constructed by at the same time. This research argues that the human users are inseparable from the technical objects, and the direction of the impact between them is also mutual rather than uni-directional. This is something more than the social construction approach which emphasizes how the implementation of technology is normalised in society and further reinforced by everyday practice. Instead, it echoes the co-construction approach by presenting the infrastructure as a heterogeneous network, which implies that both the social and the technical originate from within each other.

Chapter 7 Conclusion

This thesis, as its main case, examines the precarious electric infrastructure and the puzzle of its upgrade in Huangyao Ancient Town, a Chinese touristic site in Guangxi Zhuang Autonomous Region. As the core of a touristic project to which local governments and local community give much importance, it is incomprehensible that along with its increasing popularity it should have to tolerate electricity cuts. Taking the infrastructure as the starting point and the focus, research has discovered that politico-economic concerns are manifested in the form of problematic infrastructure in the urbanisation of this town through the development of its tourism. Regulated by local governments, the land-centred urbanisation and tourism development model is the main mechanism underlying not only the marginalisation of the local community, but also the unevenly distributed power and resources. This process then led to disputes over the planning and carrying out of an electricity upgrade. The erratic electricity shortage plays an important role in the everyday lives and business of the local community. Living with it means that local residents and business owners are consciously aware of electrical problems all the time, such as adopting technical devices to boost the supply and compete with others. Although such action does not directly solve the electricity problem as a whole, it shows the concrete negotiation that reveals individuals' subjectivities from the ground up, looking for a way out of these non-optimal circumstances.

With infrastructure as the main research target, the research was viewed from a co-construction perspective, assuming that infrastructure is a socio-technical system. In general, it argues that infrastructure consists not only of technical objects, but also the normalisation process of the social order, historical conditions and political debates. Beyond the hardware of infrastructure, other things are constantly negotiating and operating with one another. Since infrastructure included as part of the infrastructure system. Such inclusiveness turns itself into a terrain where politico-economic concerns are manifested and negotiated through everyday experience, bringing to prominence a less visible and non-traditional infrastructural public. In this way, it advocates the idea

that the “technical” and the “social” are co-constructed processes originating from within each other.

Supported by this theoretical framework, both society and technology are defined as having no previous existence; i.e. the form of neither technology nor society is determined before it emerges through the collaboration of its various human and non-human actors. As argued in the methodological chapter, they each exist in the on-going process of reassembly. This argument supports the chosen methodological approach by taking the electricity wiring system and its everyday performance as the independent viable. Therefore, this thesis adopted the “life-history interview” as the method by which to visit the human and non-human actors who had contributed to the forming and shifting of the trajectory for the infrastructure. Specific textual and ethnographic research methods were used for data collection during four field trips between 2015 and 2018.

Following this resume of the research context, framework and methodology, I conclude in the following sections by providing summaries of the research findings and discussing the contribution made, together with suggestions for further research topics. In Sections 7.1 and 7.2, I address the three sets of research questions (see Section 1.2) on the infrastructure and the puzzle of its upgrade in Huangyao Ancient Town. How can the problematic infrastructure in tourism development be understood in the context of China (see Section 7.1)? What lessons and arguments can we draw from the findings about infrastructure in general (see Section 7.2)? In Section 7.3, I briefly summarise the key contributions of this thesis and in Section 7.4 I reflect on the thesis imposed by working on the subsequent account of Huangyao.

7.1. Probing the Precarious Infrastructure and the Upgrade Puzzle

As stated in the introduction chapter, it is not uncommon to see a mismatch of infrastructure in a touristic site in rural China. A decade of tourism development has not been enough to cure all the deficiencies of infrastructural support in Huangyao. Therefore, one may well ask what exactly the problem of infrastructure concerns. It is discovered (see Chapter 4) that the infrastructure problem is beyond a question of the hardware per se. Rather it originates from the land-centred urbanisation and tourism development led by the local governments. Huangyao has experienced poor economic conditions for a long time, which has made the “alleviation of poverty” a good justification for mobilizing tourism development there. With the rise of a tourism economy, more land for further

construction has been set aside for the same purpose, triggering the town's land-centred urbanisation process. During this process, collectively owned rural land has been transformed into state-owned urban land, the right to use it being leased by the local governments to developers. This land based development model has caused territorial disputes with the local inhabitants of the Ancient Town, which then led to the mutual exclusion of representatives of the local authorities and the local community. Along the process of land-centred urbanisation and tourism development, the local governments are taking the lead, while the local community seems to have limited ways to participate.

Since it needs the cooperation of all stakeholders involved, the state of exclusion between the local governments and the local community has prevented the upgrading of the electric infrastructure as a whole within the area of the Ancient Town. But at the same time, the unevenness of the distribution of infrastructure is plainly visible. Some specific buildings in the Ancient Town have a dedicated power supply, spatially producing a new split between privileged and underprivileged (Swyngedouw, 1993, p. 323) through the dissemination of infrastructure. Contextualising the problem of the electrical infrastructure in the territorial urbanisation through tourism development, we see the mechanism behind the electricity disruption. It originated from the disputes over politico-economic concerns, not simply from mere technical difficulties over hardware.

Moving to the next chapter (see Chapter 5), it aimed to answer the question why the problem of electric infrastructure could never be solved. What exactly hinders the actors from contributing to the infrastructure upgrade? A closer look at the disputes over this upgrade showed two factors which had led to the current impasse of non-communication. The first factor was the upscaling effect of the tourism project, which had lifted the regulation of the tourist economy out of the hands of the local community and into the local offices for the county (Zhaoping County Government) and prefecture (Hezhou City Government). Although the locale of tourism development is still the Ancient Town, it is no longer a space where local community can effectively participate and make decisions. Instead, its resources are under the remote control of the local state in the service of broader tourism and ecological economic clusters. Therefore, the state of the electrical infrastructure is far from top of the agenda of the project leaders. Besides, since the local community and street committee are excluded from the tourism development, at the local level the practice of infrastructure upgrading is not effectively coordinated.

The second factor is the reform of the power industry, before which the electricity infrastructure was a substantial commodity and since which it has been a formal commodity. In its former situation it was also called “rural electricity”. Since the reform, the construction, regulation and operation of electricity have been closely integrated with the everyday life of the local community, embedded in and restricted by other non-electric institutions. After the electricity reform in 1998, the rural electricity system was gradually replaced by accountability oriented electricity companies and gradually merged with the management of the urban grid. The reform magnified the exchange value of electricity and downplayed the use value. In the meantime, the adoption of private and pre-paid meters aggrandised the exchange value of electricity for the users. In this way the continuous relationship between the former electricity providers and users was cut off by the formal exchange of electricity as a commodity, changing the relationship between its providers and users to a relationship of sellers and buyers. Together with the upscaling effect of tourism development on the electric infrastructure, everyday encounters with electrical infrastructure stopped being taken into consideration. When the different attitudes of every relevant actor are brought to bear on the practical effects of an upgrade of the electrical infrastructure, a state of non-communication arises.

The discussion provided by Chapters 4 and 5, manifested in the infrastructure disruption and the puzzle of its upgrade, show the tension growing between the dominant and the subordinate, the macro politico-economic context and the practice from the ground upwards. With the deadlock over the electrical infrastructure, the discussion then shifted to the everyday use of electricity and those who have to live with the uncertainties of the electricity supply (see Chapter 6). It has become the everyday concern of the local community, especially for heavy users such as guesthouse owners. Because of the disruption, the stable conditions to which they had grown used are always at the forefront of their concerns, as are the politico-economic uncertainties that the infrastructure reveals in Chapters 4 and 5. In this predicament, adopting additional strategies is no longer a simple matter of adding an electric device to one’s house. Instead, it is a conscious behaviour, which reminds users that the flow of electricity is something they have to maintain and compete for. From this moment, the precarious infrastructure, as well as the additional strategies, becomes political.

Additional strategies, such as adopting voltage stabilizers, have to be applied in order to maintain and repair the electricity infrastructure on a very local scale. With the help of

small devices such as voltage stabilizers, the normal operation of each business can be preserved to some extent from destruction by the vagaries of the electricity supply. Moreover, through the electric wiring and small electricity devices, the users materialize and spread their appeal for improved infrastructure, which emerges in the form of power redistribution. The action of using stabilizers turns the electric infrastructure into a political terrain, upon which competition and negotiation for electricity are organized and set in motion. It may be concluded that infrastructure has the capacity to articulate political actions functioning through its material form.

7.2. Levels of Infrastructure Stability and Participation

The story of Huangyao's problematic infrastructure and the puzzle of its upgrade show that the social, economic, cultural and political relationships are given form and function by the infrastructure. As the focal point of this thesis, what lessons can we learn from infrastructure as a theoretical framework and methodological entry point? In this section, I want to give some idea of the part played by infrastructure by summarising three aspects of the situation that stable infrastructure leads to. They are named, first, infrastructure substrate; second, infrastructure awareness; and third, infrastructure terrain. What should be noted at the outset is that there is no time relationship between the different levels of infrastructure stability, which may switch without prior notice from one to another. Following the sequence of these three aspects of infrastructure stability, the key theoretical debates and arguments mentioned in this thesis will be revisited.

Compared with various electronic devices, the electricity system itself is less visible. This is the so-called "transparency" (Star, 1999, p. 381) of infrastructure. Infrastructure supports these visible tasks invisibly and functions as the same sort of thing as a substrate (Star, 1999; Graham, 2010). It penetrates into our everyday lives without being noticed, or its users choose to ignore it. Such ignorance of infrastructure is understood as the normalisation process of infrastructure, through which the infrastructure is widely accepted and authorised as if no problem had ever existed. Against the historical direction of normalisation, it is discovered that there are three ways of explaining how infrastructure became normalised. From a Marxist perspective, this process may be understood as a fetishist process, through which resources are elevated by infrastructure away from their original environmental (Kaika and Swyngedouw, 2000, pp. 122–123). In this way, infrastructure service becomes commodified and thus considered as

something with no history. The second view comes from the cyborg approach, which argues that physical infrastructure may be understood as an “exoskeleton” (Gandy, 2005, p. 28) of the human body. Thus, using infrastructure is like using one’s body. Infrastructure is normalised as part of the human body, and the reverse is also true. There is also a cultural perspective which argues that by redefining the question of what problem a certain kind of technology solves (Pinch and Bijker, 1987a, p. 46), one may avoid an underlying problem and achieve normalisation. This may concern the design of infrastructure, which takes account of the users’ perceptions.

All the arguments above advocate the idea that the mission of infrastructure is not to be the substrate of our lives. Instead, it is the result of cooperation between the social and the technical that produces the taken-for-grantedness of infrastructure. Therefore, infrastructure should not be treated as a dead matter or something external to the general social condition. It participates in the environment in which our lives are embedded, although as a substrate its voice is too low to be heard. Infrastructure conceived in this way is worth researchers’ attention if it brings out the way in which and the circumstances in which the current infrastructure was normalised; or by taking the infrastructure which failed to be normalised as an example and examining what made it disappear from society.

Infrastructure awareness deals with unstable and interrupted infrastructure conditions. In these circumstances, infrastructure no longer functions as a substrate, but moves from the back to the front of the stage. It may be transformed from the normalised infrastructure system; or it may be an infrastructure system that has failed to normalise. Dealing with disrupted infrastructure awakens users’ awareness of the existence of infrastructure and invites them to trace the social-technical infrastructure system. As an infrastructure which cannot be normalised or renormalized, its existence always reminds the users that this kind of problem is perpetual. It refers to the environment in which the infrastructure became disrupted. Therefore, infrastructure disruption always works as the entry point of studies concerning the politico-economic context (Graham, 2010). Again, such disruption is not merely a technical problem, but one which indicates itself and what hinders it from being solved (Slack and Wise, 2015).

In the end, the terrain of infrastructure deals with the way that infrastructure organises political discussion and facilitates the forming of a public voice. The awareness of infrastructure reveals that infrastructure is a social-technical system, which is not only about the things running through it, but “also the relation between things” (Larkin, 2013,

p. 329). The relationships between human users and technical objects are inseparable and mutually influential. In this way, the boundary of what to include as infrastructure is hard to draw. Therefore, rather than setting a definite border, we view infrastructure as a complex assemblage which brings together all manner of human and non-human agents (Bennett, 2010, p. 24). Again, this argument advocates the idea that the social overlaps with the technical and the understanding of the technical should not be restricted by an instrumental view. The actor-network-theory (ANT) approach takes us one step forward by arguing that the background/backdrop exists only in the course of building a network (Bijker and Law, 1992a, p. 13; Latour, 2005), which contributes as a methodological support for infrastructure studies.

Without a fixed boundary, the small changes triggered on a very local scale, therefore, become included in the large systems as infrastructure in general. Such small changes and situated accounts may not visibly alter the system on a larger scale. However, as they originated from the awareness and participation of their local users and actors, they may set off a new round of normalisation to the specific part; or further changes may spread to other parts of the infrastructure. In this way, the infrastructure then functions as a terrain upon which political questions, negotiations and even competition are facilitated. Science and technology studies (STS) give theoretical support by supplying a user-inclusive view of technology. More credit is given to ordinary users and engineers who, under the instrumental view of infrastructure, used to be thought of as intermediary workers.

7.3. Everyday Participation through Infrastructure

The central role played by the electrical infrastructure in the case of Huangyao's urbanisation and the three aspects of infrastructure participation according to different levels of its stability are summarised in Sections 7.1 and 7.2. To position my findings within existing scholarship and to make possible contributions, I bring up the two topics below as further reflection. First, with regard to the role played by the electric infrastructure in the context of urbanisation in China, this thesis provides a view from the ground up, examining the part played by the subordinated individual in competing for infrastructure as a specific platform. Second, as a social-technical system with a material form, infrastructure fosters and organises public discussion. This contribution concerns

whether it is possible to locate the politics on an infrastructural terrain with material form closely linked to the private sphere.

As reviewed in Section 1.3, a certain mechanism links the infrastructure construction, economic growth and urbanisation of China together (Wu, 1999; Su and Zhao, 2006; Ding, 2007; W. Wu, 2010; Wang *et al.*, 2011; Yew, 2012). However, it seems that this mechanism fails to function in the case of Huangyao's problematic electric infrastructure. Why does the town show economic growth and urbanisation, but a lack of support from its electrical infrastructure? Throughout the analysis in the present study, it turns out that this mechanism is not overthrown, but rather becomes more sturdy through its support from the case of Huangyao. In the mechanism, the infrastructure is understood as an instrument aimed at achieving particular economic and political goals. The instrumental understanding of the infrastructure focuses on contributing to the land-centred urban expansion, rather than providing a certain kind of infrastructural use value. In the case of Huangyao, the problematic electricity is to be found in the very centre of the Ancient Town, where no development potential exists and disputes rage over land property. This explains why economic growth and great importance are attached to the developmental ambitions for Huangyao's tourism project, but they are not matched by the required electric infrastructure. This is the spatial layer of power distribution, through the form of infrastructure.

Since infrastructure provides concrete use value which connects individual users and their everyday lives, it provides a platform on which the struggles of the subordinated individuals can be expressed, negotiated, recorded and traced (Graham and Marvin, 2001; Graham and McFarlane, 2015). They are not necessarily presented as resistance. Instead, throughout the struggles for electricity, the opinions held by the users are seen to be diverse and ambivalent rather than consistent and united. Living and dealing with infrastructure problems in everyday life needs situated considerations and techniques. To summarise, studying the unstable infrastructure and allowing its contingencies to play a role in everyday goings-on, shows up the concrete negotiation around the infrastructure. It is a process of making subjectivities through the exercise of voices in non-optimal conditions.

The second topic concerns whether the activities functioning through infrastructure can be considered political? Or how far does the part played by infrastructure contribute to political discussion? In a broader sense, such questions may be grouped under the heading

of social, cultural and political themes from the perspective of objects. Generally speaking, the aim is to emphasise that in the discussion of politics the objects have been ignored. Besides, these studies are about enquiring into the role of specific objects in the performance of public action, or “they focus attention on the capacities of things to facilitate, inform and organize citizenship and engagement” (Marres, 2012, p. 7). However, such studies are challenged and interrogated by classical political theories, which exclude objects from political discussion since they are closely related to the private sphere. Therefore, the specific question for this thesis to answer, or to contribute to, should be articulated as follows: whether social actors need to disentangle themselves from everyday material concerns in order to participate in public discussion. Or, in other words, whether the knowledge generated from the material form of infrastructure has particular advantages.

Such challenges have been answered by James Scott’s (1998) idea that the liberal political economy resists high modernism¹³⁵. It is first stated that “a private sphere of activity [is one] in which the state and its agencies may not legitimately interfere” (ibid., p. 101). This independency of the private sphere can be seen as its advantage in political discussion. Moreover, as the claim of a “liberal political economy was not only that a free market protected property and created wealth but also that the economy was far too complex for it ever to be managed in detail by a hierarchical administration” (ibid.), it can limit the high-modernists’ ambition to weaken civil society. Therefore, the close relationship between infrastructure participation and the private sphere should not be viewed as the disadvantage of seeing infrastructure as political.

Furthermore, with its material form, infrastructure has a particular advantage when it plays a part in political discussion. This is due to the knowledge of infrastructure which is generated from everyday infrastructural experience, that fills it with local content. It is argued by Susan Leigh Star (1999) that infrastructure has a membership, suggesting that

¹³⁵ “High modernism” refers to “the aspiration to the administrative order of nature and society” (Scott, 1998, p. 88), which “envisioned a sweeping, rational engineering of all aspects of social life in order to improve the human condition” (ibid.). To achieve the order and the designs guided by high modernism needs the “unrestrained use of the power of the modern state as an instrument” (ibid.). Therefore, “an authoritarian state that is willing and able to use the full weight of its coercive power to bring these high-modernist designs into being” will appear (ibid., p. 5). As a result, it will lead to “a weakened or prostrate civil society that lacks the capacity to resist” (ibid., p. 89).

the knowledge of infrastructures is “learned as part of membership” (ibid., p. 381). Arguing by extension, Edward (2003) expresses a similar idea thus: “having fluency in infrastructure is almost exactly like having fluency in a language: a pragmatic knowing-how, rather than an intellectual knowing-that” (ibid., p. 189). With the “primacy of the ‘how’ over the ‘what’” (Lash, 2018, p. 136), infrastructure knowledge is understood as a Wittgensteinian (1958) way of knowing, which is “a condition of contextuality in which understanding any part requires a grasp of the whole that comes only through experience” (Edward, 2003, p. 189). The above arguments mesh to suggest that the knowledge of infrastructure comes from concrete infrastructural experience (Dourish and Bell, 2007). As provided by the case study of Huangyao, a situational account of infrastructure plays an important role in learning about it in relation to the entire situation. This is in accordance with James Scott’s (1998) concept “Mētis”, a word which descends from classical Greek, denoting “the knowledge that can come only from practical experience” (ibid., p. 6).

Congeaed social and political interests provide a perspective from which infrastructural constructions can be seen as assemblages (Latour, 2004) rather than the technical domain of engineers and city planners alone or instrument by which powerful decision makers dominate. In other words, since “one person’s infrastructure is another’s difficulty” (Star, 1999, p.380), social biases have always been designed into the infrastructure; so, however, at the same time, have been “the abilities to respond to crises, collapse, or disruption, whether intentionally or unintentionally” (ibid). To conclude this section, I want to make it clear that the competition for electricity in Huangyao, especially the participation through “electricity boosting”, offers a political terrain upon which an untraditional public organized by infrastructure is formed. This terrain is where the political issues are raised, discussed and negotiated. The political participation on this terrain links the private with the public, through the material form of infrastructure.

7.4. Future Research

The empirical discussion in this research is mostly about the current condition of the infrastructure in Huangyao, in relation to its state-led and land-centred model of tourism development. The current findings show how little proper public engagement there has been with the process of tourism development, especially regarding the discussion of upgrading the electrical infrastructure. The politico-economic approach occupies much

of the discussion about the model of tourism development, the way in which it led to the present delay and the non-communicable state of affairs. I wonder, for example, if the cultural dimension of building the infrastructure has an influence on the local community, and vice versa.

For example, in the current research, I have discussed the importance of clan in Huangyao, as well as the changing population structure which prevents the clan from functioning as it did in the past. This idea could be taken further by engaging more deeply in interviewing and gathering data from local business owners, as well as clan leaders. One thing to note is that local villagers and clan leaders are an inescapable part of the tourism industry. Although a proper public discussion among all the stakeholders has not been held yet, I am curious to find whether public discussion has taken place within specific groups. Where are the boundaries between groups? How are the groups organized? Do they overlap with the clan system? To what extent is the present social structure different from that in the past?

Another possible direction for future research is to look at the engagement of local people with other aspects of tourism related infrastructure, such as the sanitation system and the treatment of sewage. This could be a separate study, but still one that could be compared with the present case study of electrical infrastructure upgrading. As far as I know, the situation of the sewage treatment system within the ancient town has been much more complicated than that of the electrical infrastructure. Since the sewage pipes connect every household much more closely than the electrical installations do, the engagement of the local community will play a much more important role. How do the local community and the tourism leaders, such as the local authorities and the tourism company, work together to deal with domestic wastewater when increasing water pollution is harming the local landscape and directly affecting the tourist sites?

7.5. Ending with Reflections

In writing this thesis, I was always asking myself how far actions to mitigate the lack of electricity improved the condition of infrastructure. Was I over-interpreting the infrastructure, even though this was a study mainly about it? As noted towards the end of Section 6.5, although the electricity wires were upgraded in the Autumn of 2016, which was soon extolled as an achievement of “electricity boosting”, the overall condition of electricity supply did not improve. Even today, in 2019, more than two years after the last

electric infrastructure upgrade, people are still suffering the same conditions. On the one hand, it supports the argument that electric infrastructure is more than an issue of hardware. On the other, it also reminds me to reflect on the significance of infrastructure participation, which should not be understood merely as a manner of making direct change.

To clarify my attitude, I would like to cite words from James Scott in his famous work *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. After examining the features of high modernism and the reasons for its failure, Scott says that he is against neither the high-modernist nor the planned social order, but “against an imperial or hegemonic planning mentality that excludes the necessary role of local knowledge and know-how” (Scott, 1998, p. 6). His arguments should not be understood as merely expressing an anarchist case against the state itself. Instead, by providing the concept of *mētis*, the importance of practical knowledge, which tends to be dismissed by formal knowledge, is emphasised. This is his initial intention: to understand that states “driven by utopian plans and an authoritarian disregard for the values, desires and objections of their subjects, are indeed a mortal threat to human well-being” (*ibid.*, p. 7). The knowledge generated from Huangyao’s electricity participation shows the significance of such practical knowledge. With its material form, the problematic infrastructure reveals the politico-economic concerns behind and transmits it to every user and geographic corner. This is not a matter that formal knowledge may convey.

To end this thesis, I want to introduce a folk saying that I learnt in the field work. It comes from a dialogue between a junior civil servant *Ji* who was working in the Ancient Town Scenic Area Administration and a middle-aged local resident who was a friend of the junior civil servant *Yu*. One the day before this dialogue, several houses near the entrance to the Gui-Wu expressway had been demolished to build the Landscape Avenue (see Section 4.4).

Yu: Sometimes people (the local governments) do it (forced demolition) because it is their job. But you must not participate in such evil things. If some of the villagers really take the matter to heart, they will get back at you. It is very dangerous for a girl like you. Stay away from it.

Ji: I’ll just work in the office. Nowadays, the local government doesn’t do those things (forced demolition) themselves. They invite people from other towns. Villagers even

have no idea who has pulled their houses down. They call it the “remote enforcement mode”.

Yu: So they also know what to fear! There is a saying: Mountain and water has a chance to meet (山水有相逢, Shanshui You Xiangfeng)¹³⁶. Thirty years after you pull down my house, we may still by chance meet on the street! You are the one who demolished my house!

Yu’s last sentence is a folk saying in southern China. In this context it means that it is always possible to meet again. It persuades people not to pursue anything to the brutal end, but always leave a little leeway. The interesting point here is that objects like the mountain and the water are used as metaphors to invoke the universality of relevance. This might be used as a folk annotation of Latour’s

argument that material objects congeal time-space and facilitate the remote encounter of various actors (Latour, 1994). With a material base, “we hourly encounter hundreds, even thousands, of absent makers who are remote in time and space yet simultaneously active and present” (ibid., p. 40).

¹³⁶ The original text is “Even mountain and water has a chance to meet; needless to say human beings?” (山水尚有相逢之日，岂可人不留个相与? Shanshui Shangyou Xiangfeng Zhiri, Qike Renbu Liuge Xiangyu)

Appendix 1: List of Interviewees and Schedule

Note: 1) The “Code” consists of the type of interview and the date when the interview was taken. “I” refers to one to one interviews, and “G” refers to group interviews. (2) For ethical reasons, the names of guesthouses and interviews are anonymised.

Code	Venue	Participants
I150805	Guesthouse Q, Tianran Street	Interview with Q, the owner of Guesthouse Q.
I150806	Guesthouse R, Tianran Street	Interview with a local worker H.
I150807	Guesthouse RB, Tianran Street	Interview with a local worker Y who used to be a clan leader from a nearby village, and worked as the manager of public owned company 10 years ago.
I150808	Guesthouse RB, Tianran Street	Informal interview with guest C from Hezhou Government.
G150809	Guesthouse RB, Tianran Street	Group interview with H, WA, the owners of Guesthouse RB, guest A, and guest B.
I150810	Guesthouse H, Yingxiu Street	Interview with YE, the owner of Guesthouse H.
G150811	Guesthouse RB, Tianran Street	Group interview with guesthouse owner H, local worker Y, and one public servant J from SAA.

I150812	Touring around the Ancient Town	Interview with the volunteer worker LD at Guesthouse RB.
I150814	Guesthouse RB, Tianran Street	Interview with the local domestic helper of Guesthouse RB.
I150815	Eco-agricultural-tourism Park M, Huangyao	Informal interview with a local worker X and security Z.
I150816	Guesthouse RB, Tianran Street	Interview with local worker Y.
I150817	Guesthouse S, Zhongxing Street	Informal interview with the owners of Guesthouse S.
G150817	Reservoir Z, 3 kilometres away from the Ancient Town	Group interview with the owner of guesthouse RB and guesthouse A, and guest D and E.
I150820	Guesthouse RB, Tianran Street	Informal interview with the mom of Guesthouse RB's landlords.
G150820	Guesthouse R, Tianran Street	Group interview with local worker Y and H.
I150823(1)	Guesthouse H, Yingxiu Street	Interview with tour guide Z working at the tourism company.
I150823(2)	Guesthouse H, Yingxiu Street	Interview with YE, the owner of guesthouse H who used to work as the accountant of the county government.
I150825	Guesthouse R, Tianran Street	Interview with LI, the local manager of guesthouse R.

I150827	Guesthouse L, Tianran Street	Interview with the owner of Guesthouse LA.
I151002	WeChat	Interview with QI, the owner of Guesthouse Y.
I170324	Guesthouse B, Tianran Street	Interview with the owner of Guesthouse B.
I170328	Guesthouse B, Tianran Street	Interview with CA, the second owner of Guesthouse B.
I170320	Guesthouse RB, Tianran Street	Interview with public servant J who is working at HTIMC.
I170321	HTIMC, 2 nd floor	Interview with public servant W who is working at HTIMC.
I170325	Guesthouse RB, Tianran Street	Second interview with public servant W who is working at HTIMC.
I180125	Tongji Planning Building, Shanghai	Informal interview with magazine editor CU.
I180130	The Clover, No. 63 Design and Creative Factory, Shanghai	Interview with urban planner LY at Tongji University.
I180205(1)	Tongji Planning Building, Shanghai	Interview with urban planner WA from Tongji University.
I180205(2)	Tongji Planning Building, Shanghai	Interview with urban planner L from Tongji University.

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