

This is an Open Access document downloaded from ORCA, Cardiff University's institutional repository: <https://orca.cardiff.ac.uk/id/eprint/132684/>

This is the author's version of a work that was submitted to / accepted for publication.

Citation for final published version:

Yu, Li , Chen, Chun and Choguill, Charles 2020. "Dipiao", Chinese approach to transfer of land development rights: the experiences of Chongqing. Land Use Policy 99 , 104870. 10.1016/j.landusepol.2020.104870

Publishers page: <http://dx.doi.org/10.1016/j.landusepol.2020.104870>

Please note:

Changes made as a result of publishing processes such as copy-editing, formatting and page numbers may not be reflected in this version. For the definitive version of this publication, please refer to the published source. You are advised to consult the publisher's version if you wish to cite this paper.

This version is being made available in accordance with publisher policies. See <http://orca.cf.ac.uk/policies.html> for usage policies. Copyright and moral rights for publications made available in ORCA are retained by the copyright holders.



# **“*Dipiao*”, Chinese Approach to Transfer of Land Development Rights: the Experiences of Chongqing**

Chun Chen<sup>1</sup>; Li Yu<sup>2</sup>✉; Charles Choguill<sup>3</sup>

(1. Chongqing Jiaotong University, China; email: chenchun@pku.edu.cn 2. Cardiff University, UK; email: yul@cardiff.ac.uk 3. Zhejiang University, China; email: cchoguill@gmail.com)

## **Abstract:**

A contradictory policy in Chinese rapid urbanization comes from the twin demands for urban development land uses due to urban expansion and the protection of cultivated land for food security. *Dipiao*, a type of development rights transfer in Chongqing, aims at protecting cultivated land, optimizing the urban-rural land use structure, increasing villagers' income and easing the tensions between cultivated land protection and urban land development. The mechanism of *Dipiao* seems to be a solution to address the Chinese dilemma of land uses in urbanization. However, after delivery of this mechanism for 4 years, the market of *Dipiao* began to fall, especially on the demand side. The purpose of this paper is to study the determinant factors, including higher cost, uncertainty and decreases in benefits, developers' unfulfilled expectations, and accessibility to alternatives, that affect the market of *Dipiao*. It is expected that this research may offer some inspiration to government policy makers to reduce transitional costs in the *Dipiao* mechanism.

**Key Words:** *Dipiao*; urbanization, transfer of development rights; urban and rural integration; farmland protection

## **1.Introduction**

A policy contradiction in the rapid urbanization in China comes from the twin demands for urban development land and urban expansion and the protection of cultivated land for food security. Cultivated land around cities has been largely occupied for urban development use, which has been driven primarily by urbanization and industrialization (Lin & Ho, 2003; Long *et al.*, 2012). On the other hand, during this urbanization process, when a rural population of more than 10 million moves to cities every year, land occupied by rural settlements has not declined despite the massive migration (Liu *et al.*, 2015). There is now a large amount of vacant rural housing, or so-called “hollow villages,” due to rural migrants working in urban areas but continuing to build and maintain houses in rural areas. This is becoming a serious problem in rural China. The pressure on farmland as a consequence of both urban sprawl and uncontrolled expansion of rural construction has raised great concerns for food security (Huang *et al.*, 2011). The protection of cultivated land has become the first priority and the responsibility of Chinese land officials (Lichtenberg and Ding, 2008). In order to solve the forthcoming food security problem, Chinese central government has established a highly centralized land management system and a strict farmland protection policy through the top-down land quota system to guarantee food supply (Ding, 2003; Zhang *et al.*, 2014). Under such a stringent land control policy, local governments have struggled to make land available to support continuous urbanization and have been sympathetic to exploring possible innovative land management schemes. Some progressive experiments have been carried out in various pilot regions (Yuen, 2014). In such a context, the Chinese central government issued a scheme of land management

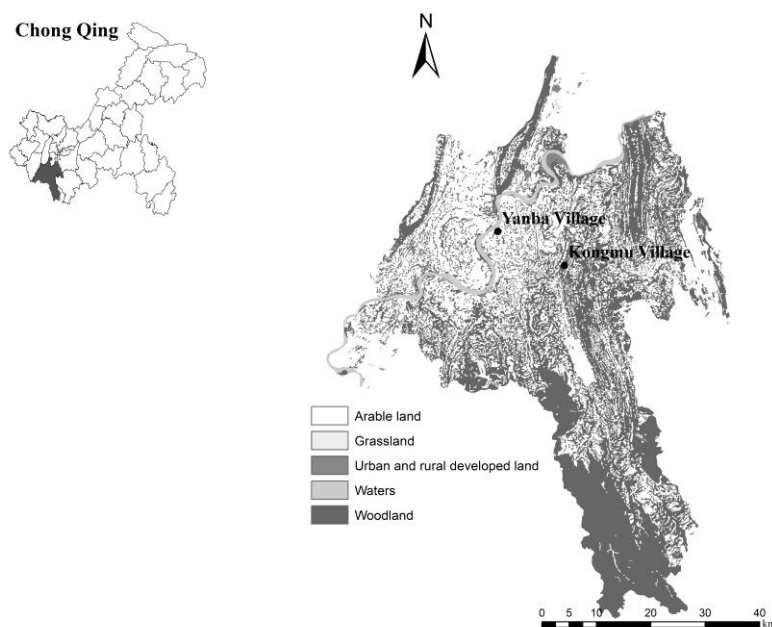
to “Dynamically Link Urban and Rural Development Land Use Changes” (The State Council, 2004) in 2004. This management scheme has now been extended to almost every province to solve the policy dilemma in relation to preserving limited agricultural land versus promoting urbanization in China (Wang, 2009). The key objective of the scheme is to achieve equilibrium in the supply of land in China by balancing increases in urban development land (driven by urbanization) with decreases in rural development land (facilitated by out-migration) (Long *et al.*, 2012). The “Voucher of Transfer for Land Development Rights” (*Dipiao*), which is a marketization variant of the policy with the economic function of integrating urban and rural land use changes (Yuen, 2014), has been initiated in Chongqing. The mechanism of *Dipiao* is established for protecting and increasing arable land while providing available land for urban development. Moreover, a *Dipiao* transaction increases the property income of rural villagers because 85% of the net income from the transition of land use (Chongqing Government, 2011) should be paid as compensation to the villagers who reclaimed their homesteads and these villagers can obtain cash directly after the transaction.

In December 2008, the Rural Land Exchange Centre, responsible for *Dipiao* delivery, was established in Chongqing. Since then, the *Dipiao* mechanism has played an important role in reducing land use tensions, protecting arable land, and promoting more equal urban and rational development by protecting rural villagers’ rights and interests. The *Dipiao* has made a contribution to rapid regional economic growth and urbanization in Chongqing while avoiding the inflation of housing prices by continuing provision of land for urban development. For many years, experimental practices in local regions have been of significance in policy formation in China as a bottom-up approach. The Chinese central government has positively evaluated *Dipiao* (State Council, 2009). Therefore, it becomes an exemplar of land reform in general and the linking urban and rural development land use in particular. According to the data from the Rural Land Exchange Center in Chongqing, by early May 2016, the *Dipiao* has been used to transfer 11,800 ha with a total value of 35.34 billion yuan. This means that cities transferred more than 35 billion yuan (about \$486 Million US Dollars) of funds to the rural areas. It is important to analyse the *Dipiao*, Chongqing, an experimental practice, the outcome of which may make contributions to both academic debates and policy making in the transfer of development rights (TDR) approach to protection while sharing development profits for all.

It is our argument that the mechanism of *Dipiao* is a type of TDR in the Chinese context. The main principles of TDRs, which were initiated in the 1960s in the USA (Linkous *et al.*, 2019; Linkous, 2016; Renard, 2007) and then practiced in European countries, have been adopted in the process of *Dipiao* delivery.

It is suggested by Falco and Chiodelli (2018) that TDR programs that can be operated in different contexts and may be comprised of different options and characteristics. This research explores the mechanism of *Dipiao* as a type of TDR in the Chinese context. It addresses a number of major research questions, including how to understand *Dipiao* from the perspectives of TDRs from the social, political and institutional context in China; to what extent that there are side benefits from *Dipiao* while agricultural land is being protected; why *Dipiao* has experienced a decrease in its demand after 8 years of use; and the lessons that can be learned from *Dipiao* in Chongqing as a type of TDR. To address these questions, this research attempts to examine the mechanism of *Dipiao* adopted by Chongqing Municipal Government, to understand the stimulation of *Dipiao*, and to analyze the determinants affecting the demand and supply of *Dipiao*. This paper is divided into four sections. The second section discusses the TDR and the mechanism of *Dipiao* in Chongqing as well as the systematic analysis of this operating mechanism and its comparison with TDRs. A detailed analysis is then performed to identify the impacts and problems with *Dipiao*, particularly with respect to demand. This paper concludes with a summary of major findings and a discussion of policy implications.

In this research, the authors have mainly relied upon official documents and the policies of and information provided by Chongqing Municipal Government and Chongqing Rural Land Exchange Centre. This is because land in China is under state ownership in urban areas and collective ownership in rural areas. As a result, all transfers of land use have to be controlled and managed by governments. There are no alternative sources for data collection. The authors have established a good relationship with the staff of Chongqing Rural Land Exchange Centre to access appropriate official documents and necessary information. This is very useful since it helps us to understand and analyse the factors that impact demand of receiving side of *Dipiao*. The authors selected the villages in *Jiangjin* County under jurisdiction of Chongqing<sup>1</sup> for primary data collection (Figure 1) as recommended by the Chongqing Rural Land Exchange. The authors have visited *Li* Town, which was the first pilot project for *Dipiao* delivery in Chongqing, to investigate and interview local officials and villagers. In our survey, we interviewed the 6 governmental officers who were responsible for land management from *Li* Town, sub-branch of Chongqing Bureau of Land Administration (which has been emerged with the planning authority and renamed as Chongqing Bureau of Planning and Natural Resources). In *Kongmu* village, which is under jurisdiction of *Li* Town, the authors interviewed the village head and 32 villagers who were selected randomly from a list of participants in the first *Dipiao* transaction. Local governmental officials from *Li* Town assisted the investigation. In the other village, *Yanba* Village in *Hualong* Town, the authors carried out a focus group discussion with 4 villagers who were the representatives of local villagers involved in land reclamation. The findings here are drawn from the notes of these interviews and focus group discussions. *Jiangjin*, one county in Chongqing, was selected for empirical research. Although the situation in other countries is similar, there are still certain differences in the social economic and environmental context, which is a limitation of this research.



Source: Research

<sup>1</sup> Chongqing, consisting of 26 urban districts, 8 counties, and 4 autonomous counties with total territory of 82,400 km<sup>2</sup> and population of 31 million (8,518,000 urban residents), is a major city in southwest China under direct jurisdiction of the central government. *Jiangjin* is one of eight counties in Chongqing. The population of *Jiangjin* County is about 1.3 million with a territory of 3,216 km<sup>2</sup>

## 2. TDR and *Dipiao*, the Chongqing Approach to TDR

### 2.1. Transfer of Development Rights (TDR)

The TDR concept is defined by Nelson *et al.* (2012) as a means of transferring development rights from an area being preserved into an area proposed for the higher residential density development. TDRs in the USA and Europe are used to separate “development rights” from the bundle of property rights transferred through a market. This tool intends to address the contradiction between the pressure of growth and protection of natural resources. It has provided a resolution to the dilemma of balancing urban growth with protection of the ecological environment, agricultural land, ground water and the sites of historical and cultural interest (Pizor, 1978; Chiodelli and Moroni, 2016; Tavares, 2003).

The operation of TDR requires both a “sending area” and “receiving area”. The “sending area” usually is characterised by restraints on development of some sort where land requires protection. The landowners are able to serve and sell their development rights. The “receiving area” is usually faced with pressures for growth. Intensive development may be needed through increasing density (Linkous, 2016; Small and Derr, 1980). Of course, the challenge in the “receiving area” may be to maintain the high standard of urban development while increasing building density (Renard, 2007).

As a tool for guiding growth and protecting public interests for low density uses of land and/or ecological environment, TDR has been widely discussed as a means of overcoming the windfall-wipe out dilemma and the perverse economic incentives created by traditional zoning (Barrows & Prenguber, 1975). TDR is a market-based instrument to leverage real estate development and to rebalance development rights to support interests from the perspective of spatial allocation (Linkous, 2017; Linkous and Chapin, 2014; Barrows and Prenguber, 1975). The operation of TDR should go through the market for exchanges of development rights (Linkous, 2016, 2017; Barrows and Prenguber, 1975). It is thought to be the best technique for preserving these areas, since it is a market-type transaction involving a low cost for the public and is more effective than zoning for the protection of land and landmarks (Berry & Steiker, 1975). The theoretical advantages of the TDR concept have been stated regularly (Budd & Thomas, 1973; Costonis, 1973; Jerome, 1974). However, studies have shown that the success of TDR depends on the large size and number of development rights sellers and buyers in the market (Linkous, *et al.*, 2019; Linkous, 2016). Critically, in a market, the demands for development rights is difficult to predict due to the uncertainty in predicting location and strength of development demands. As a consequence, the prices of development rights cannot be predicted (Barrows and Prenguber, 1975). However, if the prices of development rights are raised, the costs of a development project would then be increased because of the rise of opportunity cost, including capital, risks and taxes (Small and Derr, 1980). It is because of uncertainty in the market, that in practice few TDR programs have been as successful at creating active markets as the advocates had hoped. There may be some possible reasons for such inactive markets, but the most important one appears to be too little demand for TDR (Kopits *et al.*, 2008).

A continuing problem in many TDR programs lies in the demand side of the market. Many jurisdictions allow TDRs to be used to increase density only in established urbanized areas and

town centers. However, this outcome is difficult to achieve in some communities. Possible reasons may include a lack of demand for higher density and opposition by existing residents to more development. Most of the programs where demand has been strong have allowed TDR to be used in relatively low-density zones. There are some studies on the ways to increase the demand for TDRs. Kopits et al. (2008) studied Calvert County, Maryland, one of the few long-standing active TDR programs, as a case study area and found that baseline zoning was a critical determinant of TDR use, as demand was lower in the relatively high-density residential areas than in the low-density rural areas. Carpenter and Heffley (1981, 1982) developed a theoretical model of TDR programs and found that reducing the baseline allowable development on all properties, or “downzoning”, would tend to increase TDR demand in the receiving areas, and increase TDR prices.

The supply of development rights is also difficult to determine since the landowners’ decision to sell depends on the compensation they expect if the land was developed in the absence of the TDR program (Barrows & Prenguber, 1975; Small and Derr, 1980). An empirical study conducted by Conrad & LeBlanc found that the supply responses of TDR were determined by five social economic factors, including “development value, variance of development value, residual agricultural use value, age of landowner, and the land use intentions of prospective heirs” (Conrad & LeBlanc, 1979, p.275).

*Dipiao* in Chongqing, the features of which are similar to that of TDR, was designed to address the contraction policies of meeting the demand of land support for development in urban built areas while protecting cultivated land and increasing benefits of rural villagers from Chinese urbanisation and industrialisation

## 2.2. *Dipiao* and its evolution

In the process of its rapid urbanization, Chongqing is encountering two serious contradictions in land development. The first one is farmland protection versus the demands for urban development land for growth; the second one is the shortage of development land for use in urban areas versus the large amount of development land left vacant in rural areas (Chen, 2014). According to the China Land and Resources Bulletin, from 1997 to 2007 the national total amount of rural development land had an inverse relationship with the total rural population: the rural population decreased by 98.6 million, while the rural residential land actually increased by 1,100km<sup>2</sup>. Rural residential land per capita increased from 193m<sup>2</sup> to 218m<sup>2</sup>. An official land use survey covering 390,000 rural households in *Jiangjin* county of Chongqing, made by Chongqing Resources Housing Survey and Planning Institute in 2009, found that 23% of households totally abandoned their contracted land; 60% of households lived exclusively on non-farm income; many rural houses were empty or in an abandoned state; and the rural homestead area reached 198 m<sup>2</sup> per capita, which was much higher than the ceiling of 150 m<sup>2</sup> set by the national village planning standard.

Against this background, the “Voucher of Transfer for Land Development Rights” (*Dipiao*), was proposed by the municipal government of Chongqing as an innovative experiment to address this land use policy contradiction. *Dipiao* was designed to increase efficient use of land in rural areas by encouraging rural villagers at a volunteer base to reclaim cultivated land from homesteads that may not be still necessary due to their movement to urban areas; while providing available land for urban and economic development as demanded for urbanisation and industrialisation. The mechanism of *Dipiao* also meets the central government’s policy of

“dynamically linking urban and rural development land use changes” (The State Council, 2004), a ground-breaking reform of land development rights. Under this system, rural collectives or peasant households who reclaim a certain amount of cultivated land by consolidating and changing the functions of rural development land, including land occupied by their houses and affiliated facilities, township and village enterprises, rural public facilities and welfare undertakings, are able to get a *Dipiao* with an equal amount of development area land. The *Dipiao* is allowed to circulate freely in the urban land market. It is compulsory for anyone who attempts to develop a land parcel in the urban fringe to purchase a *Dipiao* with sufficient area of land development rights prior to the process of land transaction in the urban land market. For instance, if a property developer decides to develop ten hectares for a real estate project outside Chongqing City Centre, the developer has to first buy a *Dipiao* of ten hectares at the market price corresponding to the reclaimed ten hectares of cultivable land of rural development land in one or more villagers in the countryside (Lafarguette, 2012).

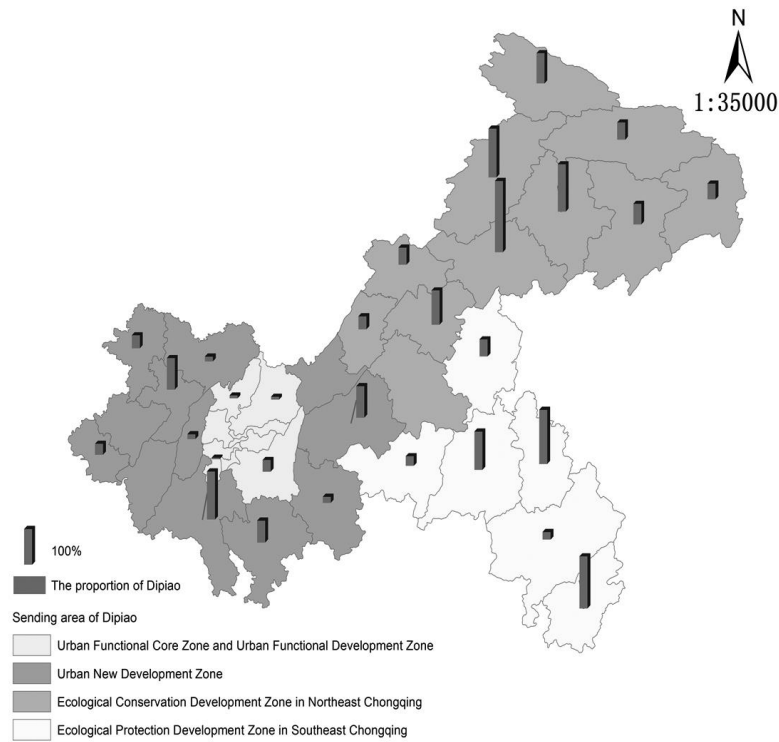
The first *Dipiao* in Chongqing was introduced in *Kongmu* village, which covers an area of 1,860 ha, including 467 ha of arable land and 300 ha of forest land. The village has 2,079 households with a population of 6,626, among which 2,150 persons (in 1,100 households) are migrants working in urban areas. About 450 households have moved away from the village, working and living in urban areas all the year round. Most of their rural houses are left vacant. The average net income in *Kongmu* village is 7,500 yuan per capita, 60% of which comes from non-agricultural jobs in urban areas. In 2008, 32 households in this village participated in the first transaction of *Dipiao* with their reclamation of 39,067m<sup>2</sup> of homestead land. It was found in our survey that most villagers are satisfied with *Dipiao* because it had effectively revitalized their idle homesteads and simultaneously increased their income.

### 2.3 Innovative Features of *Dipiao*

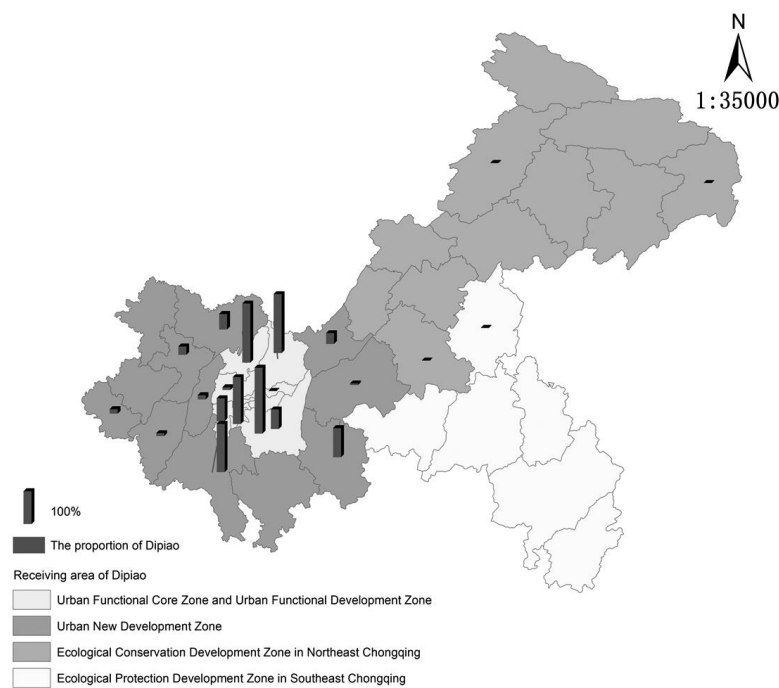
The *Dipiao* system has four innovative features that are fundamental to its operation in line with the Chinese context and thus worth highlighting.

*Dipiao* has improved land use efficiency and facilitated urban-rural integration by allowing inter-regional quota exchange within the whole municipality of Chongqing. This is different from the other areas that deliver government’s policy of “dynamically linked urban and rural development land use changes” (State Council, 2004), the effect of which on land management has been very limited due to the lack of a trans-regional linkage mechanism (Long *et al.*, 2012; Tang, Mason, & Sun, 2012). The linkage between urban land expansion and rural land decrease is limited within the same county; cross-county quota transfer is strictly prohibited. Nevertheless, inter-regional transactions of urban and rural development land quotas are realized by the innovative *Dipiao* system in Chongqing. Such an inter-regional linkage has enabled peasant households in remote mountainous areas to share in the land appreciation around the city and promoted urban-rural integration of resources and development. By comparing the spatial patterns of sending areas and receiving areas of *Dipiao*, we argue that the inter-county transactions of *Dipiao* in Chongqing has on one hand facilitated agricultural agglomeration and ecological restoration in the remote rural areas in the southeast and northeast of Chongqing, while on the other hand, guaranteeing a sufficient supply of development land surrounding the urban core and economic development zones (Figure 2). The spatial differentiation and linkage are conducive to the revitalization of inefficiently utilized rural development land and the intensification of urban development land use by enhancing the concentration of urban population and economic activities. For this reason, the ratio of urban to rural development land in Chongqing was adjusted from 0.35:1 in 2008 to 0.42:1 in 2012, indicating an optimizing and efficient trend of land use structure in both rural

and urban areas since the implementation of *Dipiao* (Chongqing Rural Land Exchange Centre, 2015)



(a) *Dipiao* Sending Areas



(b) *Dipiao* Receiving Areas

Source: Produced by the authors according to the data from Chongqing Rural Land Exchange Centre



The innovative principle of the “reclamation prior to occupation” has guaranteed the dynamic balance of increasing cultivated land and supplying land use for urban development which is one of the primary goals of *Dipiao*, and the Chinese government’s policy of “dynamically link urban and rural development land use changes” (State Council, 2004). The model of “dynamically linked urban and rural development land use changes” has been distorted in many areas with the common phenomena of “land occupation before reclamation” and “land occupation without reclamation”. The rural land was occupied previously and the rural development land was reclaimed afterwards, which leads to occupation without reclamation or with less reclamation. The quantity and quality of the cultivated land is not guaranteed. However, due to the special nature of *Dipiao*, the reclamation for cultivated land should be checked before the transaction process. The rural homestead reclamation for arable land is prior to the land occupation for construction, which overcomes this problem.

More crucial, *Dipiao* has enabled peasants in remote rural areas to share the dividends generated in the process of urbanization and land development within the city center. It is stipulated by Chongqing government (2011) that 85% of the income from land transformation should be given to villager households, leaving the other 15% to rural collectives. Due to this innovative feature, the proportion allocated to the villagers is much higher than the standard of compensation under land acquisition. According to the information from Chongqing Rural Land Exchange Centre (2015), *Dipiao* brings three kinds of income to the villagers, including direct income of 120,000 RMB yuan per mu (667 m<sup>2</sup>) for the villagers; continuity of the ownership and use rights of the new arable land after reclamation; and the priority of the former holders for farming, which will increase the villagers’ operating income indirectly. In addition, the villagers will earn 2,000-3,000 RMB yuan per mu (667 m<sup>2</sup>) if they are working on the reclamation.

One case from our survey is a good example to support this argument. Mr. Lin, a villager in *Yanba* Village, responding our question of “what benefits the local villagers can obtain from land reclamation” in the focus group discussion, illustrates the importance of *Dipiao* to his family. Mr. Lin created 530 m<sup>2</sup> of land quota by reclamation of his homestead in 2009; among which, 60 m<sup>2</sup> quota was for his own new house construction. With a price of 180 yuan/m<sup>2</sup> to the reclamation villagers, Lin earned about 85,000 yuan from the remaining land quota of 470 m<sup>2</sup>. He could choose to leave the village and move to the city with the earnings from reclamation or move to the new settlement in the village. If his final choice was the new settlement in the village, the housing cost price of the new settlement for the reclamation villagers would be 900 yuan /m<sup>2</sup>, and the total price would be 120,000 yuan for a house of 130m<sup>2</sup>. Since he earned 85,000 yuan from reclamation, Lin only needs to pay 35,000 yuan for a new house of 130 m<sup>2</sup>. In addition, since the infrastructure and public facilities have been improved after unified planning and design, the current market price of new housing in *Yanba* has reached 2,500 yuan/m<sup>2</sup>. Due to the housing price increase, Lin would obtain more than 200,000 yuan of profits.

Moreover, it is not only the individual villager, but also rural village as a collective organization which benefits from the *Dipiao* transaction. The rural collective organization, e.g., villages as collective organizations, will be allocated 15% of *Dipiao* net income, which may be used to increase their potential investment in rural infrastructure. The research of Qiu (2016) shows that according to his survey in *Zhenxi* Town, *Fulin* District, the rural collective of *Honghu* village was poor before participating in rural development land reclamation of *Dipiao*. After they participated in land reclamation, *Honghu* village acquired 4 million RMB yuan from *Dipiao* profits, which was used for the construction of village roads, residential projects and other supporting infrastructure.

Similar to TDR in other countries, as an innovative feature in the Chinese political context, the *Dipiao* mechanism is delivered with respect to voluntary willingness. The households of local villagers have the independent right of determining whether or not to participate in land reclamation under the its system. In the process of implementation of the Chinese central government's policy of "dynamically linked urban and rural development land use changes" in other regions, many cases have deviated from the initial intention. In some provinces, rural development land is often reclaimed by local governments as an instrument to get more urban development land and undertaken in the name of socialist new village construction without consulting the opinions of local villagers, who are forced to quit their homesteads and move to the new flats, which is actually a deprivation of villagers livelihoods. By contrast, the reclamation for *Dipiao* must be based on the willingness of villagers according to the regulations (Chongqing Land Resources and Housing Management Bureau, Chongqing Rural Land Exchange Centre, 2011). Before the reclamation of homestead can take place, four questions are expected to be answered by the villager, including the willingness of homestead land reclamation; entrusting land reclamation agencies; of accepting current price standards; and being involved in land reclamation work in person. Without the consent of a villager as landowner, the homestead could not be reclaimed. One local official in the Land and Resources Bureau working at grass-roots level in *Li Town* told us that *Dipiao* was a new thing and the principle of voluntary participation had been implemented strictly. Without the consent and signature of villagers *Dipiao* cannot work; no plot of homestead land had been reclaimed by force. According to our survey in *Li Town*, most villagers support the *Dipiao* system, which can turn their worthless houses into treasures: one mu (667m<sup>2</sup>) of land reclamation will lead to 96,000 yuan of income.

#### 2.4. Understanding *Dipiao* from the perspectives of TDRs in different political and ownership contexts

Farmland preservation is one of the main purposes of both *Dipiao* and TDRs. *Dipiao* in Chongqing is designed to help resolve the tension between farmland preservation and urban construction, and to support the demands of urban development land on the one hand and protect productive arable land on the other. In Western countries, besides farmland preservation, TDRs are also used to provide affordable housing, habitat conservation, and many other functions for public interest.

The main differences between *Dipiao* in Chongqing, China and TDRs in the Western countries are that they are operated under entirely different contexts of land ownership and market. Due to the private land system in the USA, property owners are able to sell their development rights to, most commonly, a developer, who then uses the certificate of TDR to build in a different location. (McConnell and Walls, 2008). Nevertheless, it is different in China.

According to the China Land Management Law, land is owned either by the public or by a collective. Urban development land is state-owned, but the development land in the rural and suburban areas belongs to rural collectives<sup>2</sup>, except those belonging to the state by law. During industrialization and urbanization there are huge demand pressures on land resources and the dilemma is how to protect agricultural land and to promote urban growth. The rural collective

---

<sup>2</sup> According to Report of National Land Use Changes Survey 2006, development land of whole China occupies 3.4% of total national territory; among which, urban development land takes 16% and 79% for rural development.

development land is unable to enjoy the same access to the land market as stated-owned land. *Dipiao*, in this context, is innovative in the sense that it is an urban and rural development land supply mechanism that optimizes the layout of the stock of development land, and reduces the pressure on arable land occupied by construction.

The sending and receiving areas of *Dipiao* and TDRs are also designated by different systems of planning and zoning and thus exhibit heterogeneous regional differentiations. The sending areas of TDRs encompass lands the community would like to protect from further development (often farmed or forested areas) and the receiving areas are often designated in urban areas with infrastructure capable of permitting additional development above the baseline zoning limits. Sending and receiving areas are usually distinct and separate, but in some programs, there are regions where landowners can either sell or purchase TDRs (McConnell and Walls, 2008).

In the process of TDRs, local governments in the Western countries should determine which communities that are allowed to sell TDRs and decide those that are allowed to use TDRs for higher dense development, how dense the "receiving" areas can be, and the mechanism by which transfers are approved. The underlying zoning in both the "sending" and "receiving" areas, as well as land values when developed or used otherwise, will influence how well a TDR market works (McConnell and Walls, 2008).

For *Dipiao* in Chongqing China, the rural collectives in each district and county decide voluntarily whether to reclaim the rural development land based on villagers' views. The development land quota would be gathered in the Chongqing Rural Land Exchange Center and be auctioned off to developers. The developers who obtain the quotas of land have the right to suggest development approaches to and density of the underdeveloped land within urban planning areas.

The *Dipiao* and TDRs are all operated through market mechanisms but influenced by government's development policies. The market establishes the connections between supplies of development rights from sending areas and demands of the right in receiving areas. However, the operators for transaction of development rights may be different. The transaction of TDRs operated through a TDR bank; the prices of which are impacted by the supply and demands but assessed by the third party. In Chongqing, it is operated by a government's organization, Chongqing Rural Land Exchange Center, due to the characteristic of land ownerships that the land market should be operated by the government; the price of which is through auction by a bidding process. One more difference is the income from the TDR will be owned by the seller of TDRs. However, the incomes from *Dipiao* should be shared between rural villagers and the collective at the rate of 85% for villagers and 15% for the rural collectives.

### **3. Market Crisis of *Dipiao***

#### **3.1 The Market Changes in *Dipiao* Transaction**

The factors affecting *Dipiao* in Chongqing are similar to those which affect TDR programmes in Western countries. These include uncertainties of market, costs, demand and market size (Derr, 1980; Linkou, et al., 2019; Linkous, 2016; Kopits, et al., 2008). Chongqing, as one of the fastest growing cities in China, has experienced high demands for *Dipiao*. As a consequence, the price and sales of *Dipiao* increased significantly between 2008 and 2011. However, the price and amount of these sales in the market have fallen since 2012 (Table 1). Even so, it is estimated by the Rural Land Exchange Centre that the potential area of rural residential land consolidation could be as high as 161,047.78 ha before 2020. The local villagers have continued their willingness supply land for *Dipiao*. There has, however, been a decline in the of demand for sites, and this has led to a fluctuation in prices.

As discussed above, the *Dipiao* mechanism came into being because of the strong demand for development land due to the planned quota for land transfer imposed by the central government in order to protect cultivated land. After initial promotion and supporting measures, the expectations of real estate developers for *Dipiao* rose and they began to use it with enthusiasm. It was the Chongqing government's policy that developers with *Dipiao* had the right to independently choose the land plots within the range of areas with appropriate planning permission. However, certain factors adversely affected the demand for *Dipiao*. These included rising land costs, developers' expectations with regard to future prices, the shortage of a secondary market, and access to the land use quota by alternative means, such as discussed in Section 3.2.

**Table 1 The transaction records of *Dipiao* in Chongqing (2008-2015)**

Year	Area (ha)	Average price (yuan/m <sup>2</sup> )	Total price (billion yuan)
2008	73.30	122.78	0.09
2009	826.70	145.16	1.2
2010	1,481.33	224.80	3.33
2011	3,526.64	357.28	12.6
2012	1,489.27	313.58	4.67
2013	1,366.60	330.75	4.52
2014	1,365.00	287.18	3.92
2015	918.33	279.85	2.57
Total	1,1047.17	297.81	32.9

Source: Chongqing Rural Land Exchange Centre.2015

### 3.2 The Factors Determining Reduction in Demand for *Dipiao*

#### 3.2.1. Cost increase of *Dipiao* and uncertain accessibility to land use market

The decision to purchase *Dipiao* is derived from developers' decisions to maximize profit. It follows that the decision to bid for *Dipiao* depends on whether profits can be enhanced by acquiring *Dipiao*, which is based on the costs and potential benefits. The developers' costs are determined by the cost of the purchase and the risks and opportunities that accompany the purchase. The developer's benefits are based on the location of property and the selling price that they can achieve. Since the advent of *Dipiao*, the average auction price of *Dipiao* has increased from 122.78 yuan/m<sup>2</sup> in 2008 to 357.28 yuan/m<sup>2</sup> in 2011, which obviously has increased the purchase-cost to developers. From 2011, the benchmark for the auction of *Dipiao* has been 267 yuan/m<sup>2</sup>, a later innovation introduced to the market. The benchmark price of *Dipiao* depends on the cost of *Dipiao* and considers the cultivated land reclamation fee and new development land use fees. The cost of *Dipiao* is made up of costs of the reclamation project, management, financing, and compensation for villagers and rural collective business organizations which transferred the land development rights (Table 2). Based on the benchmark price, the *Dipiao* is auctioned for a market price in the Chongqing Rural Land Exchange Centre according to an open, fair and just principle, which is the purchase cost of *Dipiao* for developers.

**Table 2 The composition of the benchmark price of *Dipiao***

Item			Amount	Remarks
Rural development land Reclamation cost (55.5 Yuan/m <sup>2</sup> )	Engineering cost (22.5 Yuan/ m <sup>2</sup> )	Construction fee	18 Yuan/ m <sup>2</sup>	If the actual engineering cost is below 22.5 Yuan/ m <sup>2</sup> , the remainder could be used for management cost of districts (counties) and villages
		Preliminary work fee	4.5 Yuan/m <sup>2</sup>	
		Final acceptance fee		
		Project Management Fee		
		Security supporting fee		
	Management cost (16.5 Yuan/ m <sup>2</sup> )	Project management cost for Chongqing Rural Land Remediation Center	1.5 Yuan/ m <sup>2</sup>	
		Project management cost for districts (counties) and villages	15 Yuan/ m <sup>2</sup>	
Financing cost (16.5 Yuan/ m <sup>2</sup> )		16.5 Yuan/ m <sup>2</sup>	If the actual financing cost is below 16.5 Yuan/ m <sup>2</sup> , the remainder could be used for management cost of districts (counties) and villages	
Net income for rural development land use right holders and land ownership holders (not less than 211.5 Yuan/ m <sup>2</sup> )	Homestead land and its ancillary facilities	For villagers	180 Yuan/ m <sup>2</sup>	
		For rural collective business organization	31.5 Yuan/ m <sup>2</sup>	
	Rural public facilities land, land for public affairs, and the development land without specific use right holders	For rural collective	211.5 Yuan/ m <sup>2</sup>	
	Rural enterprises land	For land use right holders	211.5 Yuan/ m <sup>2</sup>	Ratio is allocated by use right holders and ownership holders

		For rural collective		Deducting those for use right holders, the remaining for the rural collective (not less than 31.5 Yuan / m <sup>2</sup> )
--	--	----------------------	--	---

Source: Chongqing Rural Land Exchange Centre 2015

Even if the developers purchase *Dipiao* successfully, they have to bear the risk of not bidding successfully in the land leasing tender process because they would have to bid for land use with other competitors equally without any priority during the land leasing tender process. If the *Dipiao* holders fail in their bidding for land use right leasing and cannot use the *Dipiao* properly, the government will return to them the money equal to the total purchase price, whereas the interests of the loan from a bank and/or other opportunity cost will not covered by government. It would inevitably lead to many developers giving up purchasing *Dipiao* due to the uncertainty of accessibility to the land for development. The case study provided by Zhou (2014) illustrates uncertainty in the market. The study shows that the first auction of *Dipiao* held in 2008, a private real estate enterprise, Chongqing *Yu Hao Lung* Industrial Company, spent 25.6 million yuan (about \$ 3.6 million US Dollars) to purchase 300 *mu* (20 hectares) of *Dipiao*. Although the company had identified satisfactory receiving areas within the urban planning area, it took the company one year and two months to find and successfully acquire a suitable land parcel, which is quite a long time for a Chinese real estate company (Zhou, 2014).

According to the data from Chongqing Rural Land Exchange Centre (2015), by the end of 2014, 70% of the *Dipiao* had eventually found receiving areas. Nevertheless, the remaining 30% of *Dipiao* was unused. The percentage of unused *Dipiao* was so high that developers had to take a risk of failing to find a receiving area. The phenomenon restrains developer's interest in purchasing *Dipiao*.

### 3.2.2. Uncertain and decreased benefits

The profit of *Dipiao* holders is derived from the property they develop in the receiving area and their exemption from the cultivated land reclamation fee and new development land use fees, which are closely related with the location of the receiving areas. Developers with *Dipiao* are able to find land plots according to the scope of the land use general plan and the city's comprehensive plan. The data from the Chongqing Rural Land Exchange Centre shows that the receiving areas of *Dipiao* are mainly districts and counties in the urban core areas. Up to December 10, 2014, nearly 77,329,300 m<sup>2</sup> of *Dipiao* were received. The districts and counties in the Urban Functional Core Zone and Urban Functional Development Zone<sup>3</sup> were the main areas receiving *Dipiao* and amounted to 68.8%. The Urban New Development Zone received 27.8% of *Dipiao*. The Ecological Conservation Zone in Northeast Chongqing and the Ecological Protection Development Zone in Southeast Chongqing received only 3.4% of *Dipiao* (Table 3). The spatial distribution of *Dipiao* is a reflection of the perceived relative profitability of different locations. In addition, once the *Dipiao* is received successfully, the cultivated land reclamation fee and new development land use fee are offset, which is around

<sup>3</sup> In 2013 based on the comprehensive consideration of population, resources and environment, economic, social, cultural and other factors, Chongqing was divided into five functional zones including Urban Functional Core Zone, Urban Functional Development Zone, Urban New Development Zone, Ecological Conservation Development Zone in Northeast Chongqing, Ecological Protection Development Zone in Southeast Chongqing.

109.95 yuan/m<sup>2</sup>, a figure that is much higher in the urban core area than in the remote districts. However, the specific locations of a *Dipiao* receiving area are not predictable. Different micro locations with different infrastructure, environmental conditions and facilities will lead to sharply different prices and profits for real estate development. It is important to note that the receiving areas of *Dipiao* are narrowly limited to allowed urban development planning areas. The data from the first four years of *Dipiao* implementation between 2008-2012 show that the receiving areas with highest return could be found in the Urban Functional Core Zone and the Urban Functional Development Zone (Chongqing Rural Land Exchange Centre, 2015). However, with the acceleration of industrialization and urbanization, the allowable urban development areas in the Urban Functional Core Zone and the Urban Functional Development Zone are insufficient. This situation can affect the profits of developers and lead to uncertainty in the market because they are not sure when the benefit of *Dipiao* ownership is able to be realized. In other words, the land use planning system is unable to allocate land as quickly as developers would wish so highlighting a tension between the regulation of spatial planning and market opportunities.

**Table 3 The receiving areas of *Dipiao***

Region	Numbers of districts and counties	Area(ha)	Ratio
Urban Functional Core Zone & Urban Functional Development Zone	9	5,320.49	68.8%
Urban New Development Zone	7	2,151.65	27.8%
Ecological Conservation Zone in Northeast Chongqing	3	179.43	2.3%
Ecological Protection Development Zone in Southeast Chongqing	10	81.36	1.1%

**Source:** Chongqing Rural Land Exchange Centre, 2015

### 3.2.3. Shortage of the secondary market

The shortage of the secondary markets for *Dipiao* significantly influences the demands of developers for *Dipiao*. Owing to an expectation of acquiring profits in a future secondary market, developers had an initial desire to purchase *Dipiao*. However, the secondary market of *Dipiao* has not been set up; while the circulation of *Dipiao* has been strictly limited.

The absence of a secondary market meant that parts of the *Dipiao* could not be properly used. After two years of implementation of *Dipiao* it seemed, from a developer's perspective, to be a shortcoming of the process if they failed to find a proper land plot for a development project within what they regarded as an acceptable timeframe. Holding a *Dipiao* for a receiving area for years after an auction was not part of their investment calculation, but frustrated the developers and reduced their motivation to purchase *Dipiao*.

There are debates on opening up the secondary market of *Dipiao*. Three main merits for opening up the secondary market are suggested as (1) the secondary market is a necessary supplement for the primary market, which can improve the circulation of *Dipiao* and stimulate



the development of the primary market (Wang & Yu, 2011); (2) it is able to encourage developers to bid for the *Dipiao*, and raise the value of *Dipiao* further which will enable villagers to have a more equitable sharing of the land value-added benefits that arise during the process of urbanization (Liu, Zhang & Quan, 2011); and (3) it helps to reduce the risk of *Dipiao* holders by providing them with new financing opportunities (Dong, 2011). The authors' survey also illustrates that *Dipiao* holders strongly wish to develop the secondary market for three reasons: (1) if the *Dipiao* holders cannot find suitable development sites, they need to transfer *Dipiao* in the market; (2) occasionally, they need to be able to transfer out the unused portion of the *Dipiao* (for example, a company purchased 66.67 ha of *Dipiao* in the Rural Land Exchange Center in Chongqing, but only used 60 ha, they would like the remaining 6.67 ha being transferred to other developers who might need *Dipiao* to have more effectively use instead of a waste in the market); and (3) transferring the *Dipiao* in the secondary market may be able to address the problem of insufficient finance in real estate development in the market by stimulating fund circulation. Because the primary market transaction process is relatively complex, many potential developers need *Dipiao* quickly with the secondary market owing to contingent development opportunities. A further consideration is that *Dipiao* is sold in packages on the primary market and the package can be too large for the small and medium enterprises who expect to meet their own requirements through *Dipiao* transfer on the secondary market (Ma et al, 2014).

#### 3.2.4. Accessibility to alternative land use quota

Faced with increasing costs and uncertain profits and accessibility to land use market, developers may seek the opportunity to obtain a development land quota in other ways and the dual track development land quota system makes this possible. The creation of *Dipiao* means that developers in Chongqing have two ways of acquiring a development land quota. One is from the planned quota, which is approved by the central government; the other is from purchasing *Dipiao* in the market.

The development land quota is controlled by the government through the General Land Use Plan and the Annual Land Use Program, which are two major instruments to achieve the goal of farmland preservation. The General Land Use Plan establishes long-term (usually 10-15 years) regulations on both the size and spatial distribution of agricultural land in places that are allowed to be converted to urban development land, particularly in the new urban development areas, where arable land is mainly occupied for urban construction. The planned development land use quota is then ready to be provided. This is the so-called "arable land occupation quota". In principle, each tier of government, from the center to the township, must formulate and observe their General Land Use Plans both in quantity and spatial distribution.

In addition to the quota allocated by the General Land Use Plan, the land use quota allocating agricultural land converting to development land by Annual Land Use Programme is also regulated by two other policy mechanisms: the "Prime Farmland Protection Rate" and the "Additional Amount of Arable Land". First, the land use quota allocated by General Land Use Plan must be implemented beyond the prime farmland protection zone, which determines the maximum new development land. Like the quota allocated by General Land Use Plan, the prime farmland protection mandate is issued from the central government to local government. The Land Management Act in China stipulates that prime farmland in each province should be more than 80% of the arable land. Moreover, to achieve the dynamic balance of supplying land use for development and protecting arable land (i.e. no net loss), the central government allocates the total replenished arable land during the planning period to each province. Thus, if the potential replenished arable land is not enough, the development land quota will inevitably be limited.

It is not difficult to find from the aforementioned discussion that once these three key quotas, including the amount of farmland used for development (Plan targets), prime farmland protection mandate and replenished arable land, are finalized, the total amount of new development land area and its spatial layout are fixed. The new development land quota of each year will then be determined by the Annual Land Use Programme (Wang, et al, 2010). Depending upon our investigations of real estate developers, from their point of view, *Dipiao* may be a relatively unattractive proposition when compared to other forms of land use quota allocations. The benchmark price set by the municipal government has dramatically increased the additional cost of urban land developers, reducing the competitiveness of *Dipiao* in comparison with the planned land use quota. Due to the high cost of a *Dipiao* transaction (297.81 yuan/m<sup>2</sup> on average in recent years) developers may have to made efforts to acquire planned development land quota through other avenues.

#### 4. Discussion and Conclusions

In line to the outcomes of this research, it is our argument that *Dipiao* demonstrates the parallels between the Chinese system and traditional TDR. Both *Dipiao* in Chongqing and TDR in the Western developed countries are designed to address the contradiction between the pressure of growth and protection of natural resources, agricultural land and other public interests. They are all operated on the base of voluntary exchange in the market between the sending and receiving sides for transfer of development rights. However, the *Dipiao* mechanism has characteristics that distinguish it from the TDR practiced in the Western countries due to the political and land ownership systems in China.

*Dipiao* in Chongqing has four main aims of protecting cultivated land, optimizing the urban-rural land use structure, increasing rural villagers' income and easing the tensions between cultivated land protection and land uses for urban development. As a market-based model to link urban and rural development land use changes, *Dipiao* has the advantage of protecting cultivated land more effectively than other regulatory efforts. *Dipiao* is held in high regard by the central government and indicates the direction of future land reform in China. A second advantage is that *Dipiao* has improved land use efficiency and facilitated urban-rural integration by allowing an inter-regional development land quota exchange within the whole city region of Chongqing. The "reclamation prior to occupation" principle has guaranteed the protection of cultivated land, which is the primary goal of *Dipiao*, and a range of China's land reforms over the past two decades. Third, *Dipiao* has enabled villagers in remote rural areas to share the dividends generated in the process of urbanization and land development around the city centre. Finally, the households of villagers have the independent right of determining whether or not to participate in land reclamation under the *Dipiao* system.

*Dipiao* is designed to overcome the imbalance of benefits among different regions and sectors, resolving, at least to some extent, the dilemma between promoting economic growth and urban development on the one hand, and preserving the ecological environment and agricultural land on the other, especially development and economic growth have been regarded as priority in China. The same as TDR in USA and European countries, *Dipiao* in Chongqing has also been challenged by a decline in demand. Within the context of the developed countries, the decline in use seems to be influenced by the difficulty in predicting demands for development rights at specific locations where development is proposed (Barrows and Prenguber, 1975). However, the supply sides of *Dipiao* in Chongqing have been very active because they are mainly the related poor villagers in remote rural areas. There are shortages of development opportunities within their home areas to increase their income and wealth. From this perspective, the delivery of *Dipiao* has a function of poverty eradication. The decline in demand of *Dipiao* has been mainly been on the demand side of the market and

generated by several causes. The costs and benefits are important in determining developers' willingness to use *Dipiao* for acquiring development land; the uncertainties in development and shortage of a secondary market for exchange and transformation of *Dipiao* have restrained the aspiration of developers' interest in *Dipiao*; moreover, under the Chinese political and land allocation system, developers are able to access land uses and development rights for urban development through other sources. This characteristic of Chinese land use policy has a significant impact on the demand site of *Dipiao*.

Our research on *Dipiao* in Chongqing has made contributions in both academic debates and land use policy making. There are very limited studies on TDR in China. From academic perspective, our research enriches the international debates on approaches to TDR in different social, political and institutional contexts. In terms of land use policy, it is clear that the mechanism of transfer of development right may become an important tool in Chinese land use policy. The Chinese government has emphasized the protection of both ecological lands and cultivated lands in the last decade. In October 2007, the 17<sup>th</sup> National Congress of the Central Committee of the Communist Party of China adopted the idea of Ecological Civilisation, which is to seek a solution to continue promoting economic growth while protecting the ecological environment. The revised Environmental Protection Act 2014 and the revised Land Administrative Act were promulgated in January 2015 and January 2020 separately. It was decided by the central government that the boundaries of ecological protection zone and basic arable lands must be clarified in spatial planning (GOCCCPC and GOSC, 2019). Because the dilemma between economic growth, and arable land and ecological environmental land protection will continue to be a main challenge, the transfer of development rights among different development functional zones with different land use policies may be increasingly important in coming decades. The experiences and lessons of *Dipiao* in Chongqing may be useful for other parts of China. It is crucial to explore solutions to alleviate the problems of *Dipiao* identified in this research.

## References

- Barrows R. L. and B. A. Prenguber. (1975) Transfer of development rights: an analysis of a new land use policy tool. *American Journal of Agricultural Economics* 57,4:549-557.
- Berry, D. and G. Steiker (1977). An Economic Analysis of Transfer of Development Rights. *Natural Resources Journal*.17:55-80.
- Budd, C. B. and N. Thomas (1973) Transfer of Development Rights: A New Concept in Land Use Management. Leaflet No. 492, Rutgers University, July
- Carpenter, B. E. and D. R. Heffley (1981). A Spatial Equilibrium Analysis of Flexible Zoning and the Demand for Development Rights. *Environment and Planning A* 13(2):273-284.
- Carpenter, B. E. and D. R. Heffley (1982). Spatial-Equilibrium Analysis of Transferable Development Rights. *Journal of Urban Economics* 12(3):238-261.
- Chongqing Government (2011). Decision on Reducing Three Gaps by Promoting Being Rich Together, Chongqing Statistics, No 8: 4-7

- Conrad J. M. and D. LeBlanc (1979). The Supply of Development Rights : Results from a Survey in Hadley, Massachusetts. *Land Economics*, 55(2):269-276.
- Chen C., W. Zhang and C. C. Feng (2014) Progress and Prospect of Urban-rural Construction Transfer. *Journal of China Agricultural Resources and Regional Planning*, 1: 61-66 (in Chinese).
- Chiodelli, F and S. Moroni, (2016), Zoning-integrative and zoning-alternative transferable development rights: Compensation, equity, efficiency, *Land Use Policy*, 52:422-429
- Chongqing Land Resources and Housing Management Bureau, Chongqing Rural Land Exchange Centre (2011) The practical guidelines for *Dipiao* policy in Chongqing, Southwest Normal University Press (in Chinese)
- Chongqing Rural Land Exchange Centre, (2015), Research Report on Sustainability of Dipiao Mechanism, Chongqing Rural Land Exchange Centre
- Costonis, J. J. (1973) Development Rights Transfer: An Exploratory Essay. *Yale Law Journal*. 83:75-128.
- Deng F. (2013). Land development right and collective ownership in China. *Post-Communist Economies*, 25, 2:190-205.
- Ding, C. R. (2003) Land policy reform in China: Assessment and prospects. *Land Use Policy*, 20 (2): 109-120.
- Falcoa, E and Chiodellib, F. (2018), The transfer of development rights in the midst of the economic crisis: Potential, innovation, *Land Use Policy*, 72:381-388
- GOCCCPC and GOSC (General Office of the Central Committee of the Communist Party of China and General Office of the State Council), (2019), Guiding Opinions on Implementation of Three Control Boundaries in Territorial Spatial Planning, [WWW document] URL [http://www.gov.cn/zhengce/2019-11/01/content\\_5447654.htm](http://www.gov.cn/zhengce/2019-11/01/content_5447654.htm) [accessed on 6 November 2019]
- Kopits, E., Virginia McConnell, V. and Walls, M. (2005), Making Markets for Development Rights Work: What Determines Demand? *Land Economics*. 84(1): 1-16.
- Kopits, E., V. McConnell and M. Walls (2008). Making Markets for Development Rights Work: what Determines Demand. *Land Economics*. 84,1:1-16.
- Huang,Q., M., Z. Li, E. Chen and F. Li. (2011). Land consolidation: An approach for sustainable development in rural China. *AMBIO, A Journal of the Human Environment*, 40(1): 93-95.
- Jerome, G. R. (1974) A Proposal for the Separation and Marketability of Development Rights as a Technique to Preserve Open Space.” *Real Estate Law Journal* 2:635-639.
- Lafarguette, R. (2012) Chongqing: Model for a new economic and social policy? *China Perspectives*, 4: 62-64.
- Lichtenberg, E. and C. Ding (2008). Assessing farmland protection policy in China. *Land Use Policy*, 25(1), 59-68.
- Lin G.C.S. and S.P.S. Ho (2003) China’s land resources and land-use change: Insights from the 1996 land survey. *Land Use Policy*, 20: 87–107.
- Linkous, E. R, (2016), Transfer of development rights in theory and practice: The restructuring of TDR to incentivize development, *Land Use Policy*, 51:162-171
- Linkous, E. R. and T. S. Chapin (2014) TDR Program Performance in Florida, *Journal of the American Planning Association*, 80:3, 253-267, DOI:10.1080/01944363.2014.985697

- Linkous, E.R., L. Laurian, and S. Neely (2019): Why do counties adopt transfer of development rights programs? *Journal of Environmental Planning and Management*, DOI: 10.1080/09640568.2018.1559044
- Liu J., T. Zhang and J. Quan (2011). The Reference Significance and Legal Rule of Dipiao System. *Media Today*, 2:37-40. (in Chinese)
- Liu, T., H. Liu and Y. J. Qi.(2015) Construction land expansion and cultivated land protection in urbanizing China: insights from national land use surveys, 1996-2006. *Habitat International*, 46:13-22.
- Long, H., Y. Li, Y. Liu, M. Woods, and J. Zou (2012). Accelerated restructuring in rural China fueled by ‘increasing vs. decreasing balance’ land-use policy for dealing with hollowed villages. *Land Use Policy*, 29:11-22.
- Ma Z. L., F. Chen and M. D. Ma. (2014) Research on the Opening and Exchange Mechanism for the Secondary Market of the Dipiao in Chongqing. *Western Forum*. 2014,24(3): 1-7.( in Chinese)
- McConnell, V and Walls, M (2008) Preservation and Development: Can TDRs Improve Land Markets? Jun 16, 2008 [WWW document] URL <http://www.rff.org/blog/2008/preservation-and-development-can-tdrs-improve-land-markets>. (accessed on 28 March 2019)
- Nelson, A. C, Pruetz, R. and Woodruff, D. (2012), *The TDR Handbook: Designing and Implementing Transfer of Development Rights Programs*, Washington: Island Press.
- Pizor, P. (1978), A Review of Transfer of Development Right, *The Appraisal Journal*, July: 386-396
- Qiu, Y. (2016) Dipiao activates the rural "sleeping" assets - Investigation from Zhenxi Town, Fuling District, Chongqing *Guangming Daily*.2016-6-02,13 (in Chinese).
- Small, L E. and D, A. Derr (1980), Transfer of Development Rights: A Market Analysis, *American Journal of Agricultural Economics*, 62(1):130-135
- Tang Y., R.J. Mason, and P. Sun (2012) Interest distribution in the process of coordination of urban and rural construction land in China. *Habitat International*. 36(3):388-395.
- Tavares A. (2003) Can the Market be Used to Preserve Land? The Case for Transfer of Development Rights. *European Regional Science Association Congress* [WWW document] URL <https://www.researchgate.net/publication/23730845> Accessed on 11 April 2019)
- The State Council. (2004). No. 28 Circular: Decision on Further Reform of Strictly Land Management, [WWW document] URL: [http://www.gov.cn/zhengce/content/2008-03/28/content\\_2457.htm](http://www.gov.cn/zhengce/content/2008-03/28/content_2457.htm) (accessed 8 April 2019).
- Wang H., R. Tao and J. Tong (2009) Trading Land Development Rights under a Planned Land Use System: The “Zhejiang Model”. *China & World Economy* 17,1: 66-82,
- Wang Y. and Y. W. Yu (2011) .The operating problems of Dipiao system in Chongqing. *Architecture Economy*. 12:61-64. (in Chinese)
- Yuen S. (2014) China’s New Rural Land Reform? Assessment and Prospects. *China Perspectives*. China Perspectives1:61-65.
- Zhang, W., W. Wang, X. Li and F. Ye. (2014). Economic development and farmland protection: An assessment of rewarded land conversion quotas trading in Zhejiang, China. *Land Use Policy*, 38:467-476.

- Zhou Q. R. (2014) *Dipiao*, a great creation. The Economic Observer. 2014.7.25, [WWW document] URL <http://www.eeo.com.cn/2014/0728/264138.shtml>, (accessed on 28 March 2019)