



LADM-based profile for farmland Tripartite Entitlement System in China

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ABSTRACT

Since the beginning of the 21st century, China has undergone a promotion of industrialisation, urbanisation and agricultural modernisation. This promotion has triggered the mass migration of rural labour forces into cities, leading to the virtual situation of the separation of farmland contract and operation rights. To respond to this issue, the central government proposed a strategy of farmland reform in China. Such reform aims to transform the former 'Bipartite Entitlement System' into a 'Tripartite Entitlement System (TES)'.¹ Land registration provides the means for recognising formalised property rights and regulating the characteristics and transfer of land-related rights. As for farmland registration in China, it serves as a basis to explore effective forms of collective farmland ownership by implementing collective farmland ownership, stabilising farmers' contract rights and liberalising farmland operation rights. Thus, in this study, on the basis of the farmland tripartite entitlement (hereinafter referred to as 'FTE') reform in China, we develop a Land Administration Domain Model (LADM)-based TES model that will serve as the basis of subsequent system development. Specifically, first, we summarise the evolution process of China's farmland rights system since the foundation of new China. Second, we propose a farmland rights system after the FTE reform. Then, the corresponding TES model is developed based on the LADM standard and some instance-level diagrams for farmland administration activities. The new functionality of the model includes improved structuring of farmland rights and restrictions (and related source documents) and improved expansion of the land information infrastructure to rural areas.

1. Introduction

China is a great agricultural country, and farmland plays a special and important role in China's economic and social development (Wu and Jin, 2009). Farmland is not only the basis for farmers to obtain incomes for production and living, but it also the key to rural stability and economic reform (Liu, 2018). Farmland institutions and regulations have always been closely related to the stage of socio-economic development, especially for property rights systems in farmland (Geng, 2017). Since the foundation of the People's Republic of China, China has already experienced two major farmland reforms. The 'First Land Reform' started in 1946 and continued until 1958. The initial allocation

of farmland was completed during this reform (Zhang, 2015). After some decades, to liberate farmers' production enthusiasm, the 'Second Land Reform' started at the end of 1978. Through this reform, the use right to farmland was once more returned to the tiller through the 'household contract responsibility system' (hereinafter referred to as 'HCRS') (Ho et al., 2004). With the promulgation of the 'Rural Land Contracting Law' (hereinafter referred to as 'RLCL') in 2002, the farmland rights system was preliminarily established. However, with the rapid development of industrialisation and urbanisation in China, a large proportion of rural labour left the countryside and poured into the city (Zhang et al., 2016). Given this context, the transfer of farmland has become an important way for farmers to expand their operational

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¹ 'Bipartite Entitlement System' refers to the separation of farmland contractual operation right and farmland ownership. 'Tripartite Entitlement System' is the second separation of farmland contractual operation rights, which is transformed into the contract and operation rights. Thus, the 'Tripartite Entitlement System' is composed of three individual farmland rights: ownership, contract right and operation right.

scale (Gao et al., 2011). Thus, China is proposing the third land reform, ‘farmland tripartite entitlement’ (hereinafter referred to as ‘FTE’) reform (Wang and Zhang, 2017). In October 2016, the General Offices of the Central Committee of the Communist Party of China (CPC) and the State Council formulated and promulgated ‘Opinions on Improving the Separation of Farmland Ownership Contract Right and Operation Right’ (hereinafter referred to as ‘the Opinion’). The Opinion points out that ‘...We should continue to explore effective forms of collective farmland ownership, through implement collective farmland ownership, stabilizing farmers’ contract right and liberalizing farmland operation right’.

As mentioned above, the transfer of farmland is very common in China’s rural areas, but the formal farmland market has not been established by far Liu (2014a). This situation can neither provide confidence for contractors to obtain employment in cities and retain the contract right, nor secure their operation rights in general. It is one of important starting points of the FTE reform. In other words, essentially, the focus of the FTE reform is to provide legal security for farmland-related rights (Liu et al., 2017). Without the security of a land title, obtaining investment funds and venture capital will be difficult (Dale and McLaughlin, 2000). Therefore, it is necessary to formalize farmland rights into tradable commodities. During this formalisation process, land registration is a key strategy for addressing tenure security and regulating the characteristics and transfer of land-related rights Dale and McLaughlin (1988). Meanwhile, As stated by the State Council (2014) and Ministry of Land and Resources (2015)², China has been promoting the development of a unified real estate registration system. The registration system should cover the whole area of China, including urban and rural areas. That is, to establish an integrated land (real estate) registration and cadastral system for both urban and rural areas. Specifically, the land registration and cadastral system in urban China is relatively mature, and there have been several studies in the system modelling, such as 3D Cadaster (Li et al., 2019, 2016), land and housing integration (Zhuo, 2013; Zhuo et al., 2015), unified registration of immovable properties (Yu et al., 2017). However, the land registration and cadastral system in rural China has not been established yet.

Based on the ‘Land Administration Maturity Model’ proposed by Oosterom et al. (2009), the development of each land administration system undergoes four stages: standards, connectivity, integration and network. Each stage should be conducted after completing the previous one. Once standards are clear, different organisations or jurisdictions can start to make a connection, and further integration and networking can occur (Lemmen, 2012). Considering the future needs of urban-rural model/system development and integration, it is necessary to adopt a standardized model in the establishment of rural part system, and appropriately refer to the existing urban models/systems. Moreover, all changes should be incremental and evolutionary (Williamson, 1986). In other words, the formalisation of land rights cannot quickly cover nationwide in developing countries: the process will be incremental (Williamson et al., 2009). Doebele (1983) also stated that ‘... attempts to install fully articulated systems from the start have, like fully developed public housing, tended to bog down into ineffectiveness when confronted with the magnitude of the problem and the high expense of processing each unit’. Therefore, we will not attempt to develop a comprehensive land registration system throughout China. Instead, we will start from the development of farmland registration system. The Land Administration Domain Model (LADM) is a conceptual schema that comprises basic information-related components of land administration (ISO/TC 211, 2012). The LADM is based on the common pattern of ‘people–land’ relationship, and it can be adaptable to global and local

situations (Lemmen, 2012). Thus, in this research, we use LADM as the reference model for the development of farmland registration system to support the FTE reform in China.

2. Methodology

On the whole, the body of this study follows the general process of system development, which is divided into three main stages: analysis, design and evaluation (as shown in Fig. 1). Each stage can be met after finishing the previous one. Firstly, from the practical and institutional perspective, the research problem and objectives are posed. Meanwhile, relevant researches are reviewed to identify the existing research situation. Secondly, the analysis stage involves two main parts: on the one hand, we review the evolution of China’s farmland system since 1949, on the other hand, the existing farmland right system is figured out based on relevant laws and regulations. Then, on the basis of these investigations, we develop an LADM-based TES model for farmland registration in China and introduce some instances for farmland administration activities for examples. Finally, we propose some discussions and concluding remarks for this research.

3. Review of existing studies on LADM

3.1. Introduction to the LADM

The LADM, published as ISO 19152, is designed for land administration system development (ISO/TC 211, 2012). It aims to find common denominators in land administration, and can be a general basis for structuring and organizing of representations of people to land related information, in databases (Lemmen et al., 2015). The LADM is an abstract, conceptual model with four (sub)packages related to parties (Party Package); basic administrative units, rights, responsibilities and restrictions (Administrative Package); spatial units (Spatial Unit Package); and spatial sources and spatial representations (Surveying and Representation Subpackage). Generally, the LADM standard provides terminology for land administration and enables the combination of land administration information from different sources in a coherent manner (ISO/TC 211, 2012). In other words, LADM can be implemented in a distributed environment in different organizations with different responsibilities in land administration domain (Lemmen et al., 2015). Therefore, LADM could be an effective conceptual model to support the development of unified system in view of the disadvantages of land administration in China such as the separation of urban and rural land administration systems. 3.2 Related Studies

As LADM was officially accepted as ISO standard, a number of pilots for LADM emerged within national and state-based land administration agencies. First, eight LADM country profiles, including Portugal, Australia, Indonesia, Japan, Hungary, The Netherlands, Russian Federation, and Republic of Korea, are provided in the appendix of ISO 19152 standard (ISO/TC 211, 2012). These profiles provide a good reference for researchers to develop their own LADM country profiles. During the development of LADM, international workshops has played a very important leading role. In the 5th LADM 2013 workshop, a number of LADM related studies were presented, which also include more state-based profiles, such as Poland (Bydłoz, 2013), China (Zhuo et al., 2013), Korea (Shin and Kwak, 2013), Brazilian (Santos et al., 2013), Kenya (Siriba and Mwenda, 2013), Republic of Croatia (Vučić et al., 2013). Then, at the 6th LADM workshop in 2017, experts further extended the LADM country profiles, such as Finland, Canada, Spain, Colombia, etc. At the same time, during the 6th and 7th workshops, a New Working Item Proposal for LADM Edition II was initially formed, so as to start the revision process of LADM standard (Lemmen et al., 2018; Oosterom, 2017). The LADM provides references for the national and regional applications and practices, and these profiles also contribute valuable local experiences for its further development. Therefore, Janečka et al. (2018) summarized the creation process of LADM

²In March 2018, according to the institutional reform plan of the State Council approved by the first session of the 13th National People’s Congress, the functions and responsibilities of the Ministry of Land and Resources will be reorganized and handed over to the newly established Ministry of Natural Resources and the former Ministry of Land and Resources will not be retained.

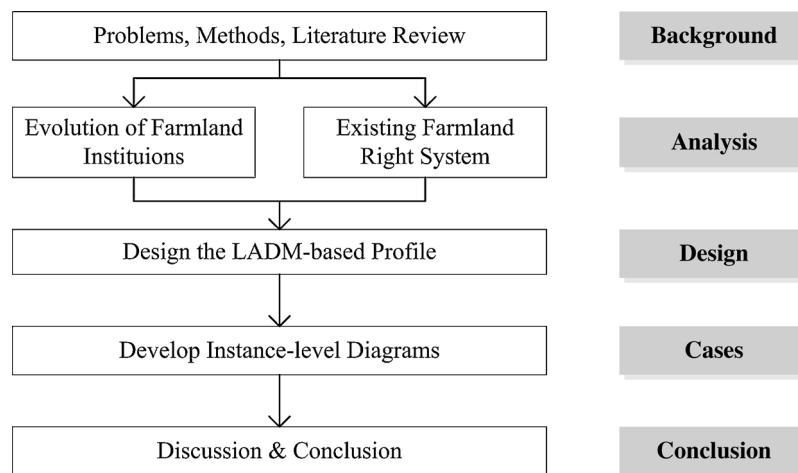


Fig. 1. Research Methodology.

based country profiles and concluded that there are three general starting points: 1) to depict the existing land administration system through LADM classes, attributes, and relationships; 2) to give an inheritance structure between LADM and the existing system; 3) to establish a mapping of elements between LADM and the existing system. Through the analysis of Turkey's country profile, Alkan and Polat (2018) believe that it is necessary to introduce LADM as a basis for the integration of different data sources so as to ensure the effective functioning of land information infrastructure. With the start of LADM Edition II revision, the focus of 8th LADM workshop is mainly on the input preparation of for the second edition, in order to form a formal proposal. Thus, many professionals presented corresponding summaries to the previous LADM researches. As for the development of LADM country profiles, Kalogianni et al. (2019) concluded that most of existing profiles lacks a general methodology as a guide, thus affecting its further development.

In contrast, LADM based profiles in China hasn't been well developed, only a few scholars have dabbled in this field. Zhuo et al. (2015) developed an integrated model for land and housing registration in China on the basis of LADM. Then, Li et al. (2016) described the ownership structure of condominium units, and proposed a CityGML-LADM ADE model to reflect the interrelation between legal objects and physical counterparts. Yu et al. (2017) developed a unified registration model for immovable properties in China based on LADM. Recently, Xu et al. (2019) developed a corresponding LADM based profile for the natural resource administration in China. Along the way, LADM is closely related to the development of 3D cadaster. In view of the development of 3D cadastre in China, it also promotes the development of LADM applications in China to some extent, and generates quite a few 3D cadastral profiles based on LADM (Ding et al., 2013; Guo et al., 2011; Hao, 2012; Ying et al., 2018, 2011; Yu et al., 2012). In addition, some scholars also take LADM as a reference to analyze the implementation and management of solar rights model associated with individual residential buildings in China (Li et al., 2019). In summary, the existing LADM based profiles in China are mainly aimed at urban areas, while the rural part hardly has any. At present, with the continuous promotion of rural land reform in China, the land (real estate) registration and cadastral system for rural areas in China has become very urgent. Meanwhile, considering the future needs of urban-rural integration, it is necessary to develop the farmland registration system based on LADM.

4. Evolution of farmland institutions in China since 1949: three land reforms

Generally, China's land ownership is locked. Therefore, the logic of

land reforms is to seek breakthroughs in the separation of ownership and use right, that is, to expand the power of use rights, give play to the initiative of land users and improve the efficiency of land use (Liu, 2014a). As regards farmland in rural areas of China, the main aim of land reforms is to maintain collective farmland ownership and strengthen farmers' use right. Since the foundation of new China, it has undergone three stages for the evolution of farmland institutions (in this study, we use the terms 'farmland institutions' and 'farmland rights systems' equivalently), corresponding to three land reforms. Moreover, the concept of land tenure can be defined as a 'people-land' relationship (Henssen, 1995). Thus, we like to use this relationship to structurally describe the evolution of farmland rights systems throughout as follows.

4.1. First land reform: Three-Level Ownership (TLO)

In the early years of the foundation of new China, large-scale land reform was conducted throughout the country, truly establishing the ownership of farmland (Dashed Box 1 in Fig. 2). From 1953–1956, although the ownership of farmland continued to belong to individual farmers, the operation rights of farmland had shifted from individual farmers to the Collective (it refers to the primary cooperatives here, Dashed Box 2). Subsequently, the country entered advanced cooperatives (1956–1957), where the collective owner evolved into 'advanced cooperatives' (Dashed Box 3). In general, from 1953 to 1957, farmland in China were formally owned by individual farmers but operated by a specific form of collectives, including the primary and advanced cooperatives. The operation rights of farmland were not formally recognised here. Only until the people's commune period was the collectivisation reform of farmland rights system completed. Dashed Box 4 clearly showed the 'people-land' relationship in this period, it was a 'TLO, team-based' farmland rights system. At this point, the 'Collective Ownership, Collective Operation' structure of farmland rights system had settled down. As Liu (2014a) pointed out, the first land reform can be summarised into the following three steps: 1) replacing farmer ownership with the primary cooperative system, 2) replacing the primary cooperative system with collective ownership and 3) forming the 'TLO, team-based' farmland rights system.

4.2. Second land reform: Bipartite Entitlement System (BES)

Historically speaking, the advanced cooperatives and people's commune divorced themselves from the actual level of the development of rural production in China. The third plenary session of the 11th Central Committee began the second land reform. Since then, the HCRS reform (referred to as the 'Second Land Reform' in this study) was

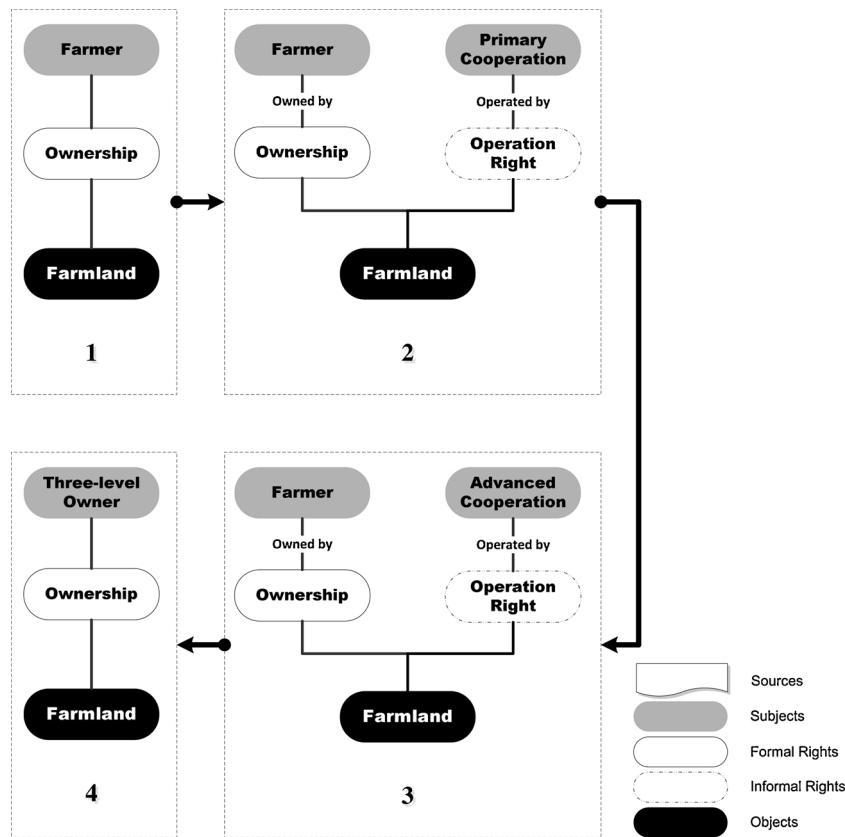


Fig. 2. Farmland Right System during/after the First Land Reform.

carried throughout the country. On January 1, 1982, the central committee of the CPC approved and forwarded the policy of ‘Summary of National Rural Working Conference’, which pointed out that ‘The rapid development of the responsibility system for agricultural production reflects the strong desire of hundreds of millions of farmers to develop socialist agriculture according to the actual conditions of rural China’. In 2002, the RLCL was adopted to ‘...grant farmers long-term and guaranteed land use rights’ from the legislative perspective. At the same time, the ‘Property Law’ legally defined the farmland contractual operation right. At this point, the farmland collective ownership and contractual operation right were separated. Generally, the implementation of the HCRS corrected the long-standing defects of a highly centralised operation of farmland and greatly mobilised farmers’ enthusiasm for agriculture production (Liu, 2018).

As shown in Fig. 3, with the introduction of the HCRS, the farmland ownership and contractual operation right were separated. All these developments led to the ‘BES’. Specifically, the contractual operation right is a type of use right setting on the ownership through a contract. The ownership was still owned by the three-level collective. Contractual operation rights are operated by farmers within the ‘collective economic organisation’ (hereinafter referred to as ‘the Collective’). Thus far, China’s farmland rights system has been fixed in the form of legal documents (i.e. household contract of farmland) for the first time.

4.3. Third land reform: Tripartite Entitlement System (TES)

With the development of the reform and opening-up policy, especially for the rapid urbanisation, the huge demand for rural labour

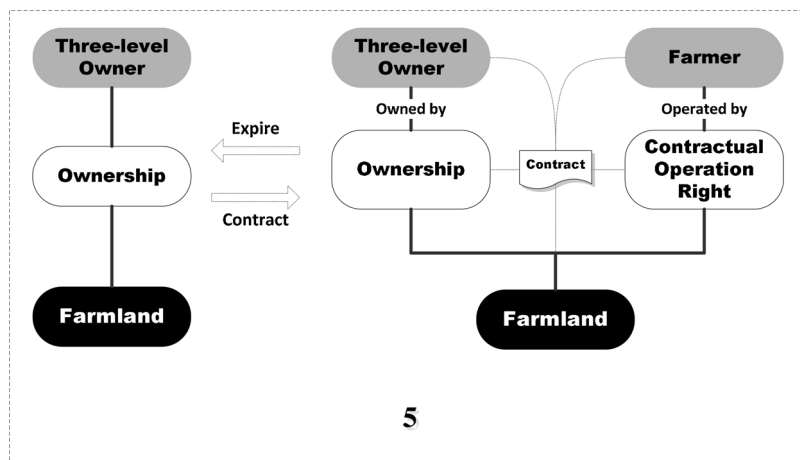


Fig. 3. Farmland Right System after the Second Land Reform.

forces occurs in cities. This situation has triggered mass migration of rural labour forces into cities, leading to a virtual situation of the separation of farmland contract and operation rights (Liu, 2014a). All these issues bring increasing challenges to the strict farmland operation system in the sense of ‘contractual household operation’.

To meet the practical needs of rural socio-economic development, the central government has made the major decision of ‘TES’ for farmland. In 2014, China’s ‘No. 1 central document’³ proposed for the first time on the national policy level the idea of ‘TES’ of farmland reform. Subsequently, the 2015 ‘No. 1 central document’ elaborated requirements on the legal expression of the strategy, thus initiating the revision of relevant legal provisions, such as the RLCL. On November 2, 2015, the General Office of the CPC central committee and the State Council issued the ‘Comprehensive Implementation Plan for Deepening Rural Reform’ (hereinafter referred to as the ‘CIPDRR’), which comprehensively defined the connotation of the ‘TES’. In October 2016, the Opinion indicated that ‘... the contractual operation right of land is divided into contract right and operation right, the three rights of ownership, contract right and operation right are parallelly existed’, ‘... form a distinct, reasonable and equal right structure’. At this point, the policy connotation and implementation path of the third land reform were clear.

Fig. 4 shows the farmland rights system after the third land reform. Based on the BES, the contractual operation right was derived from the ownership. Then, in the TES, the contractual operation right will be further divided into the contract right and operation right as soon as the transfer of farmland occurs. After the second separation, the contract right will be retained by the farmer in the Collective, and the operation right will be transferred to the operator.

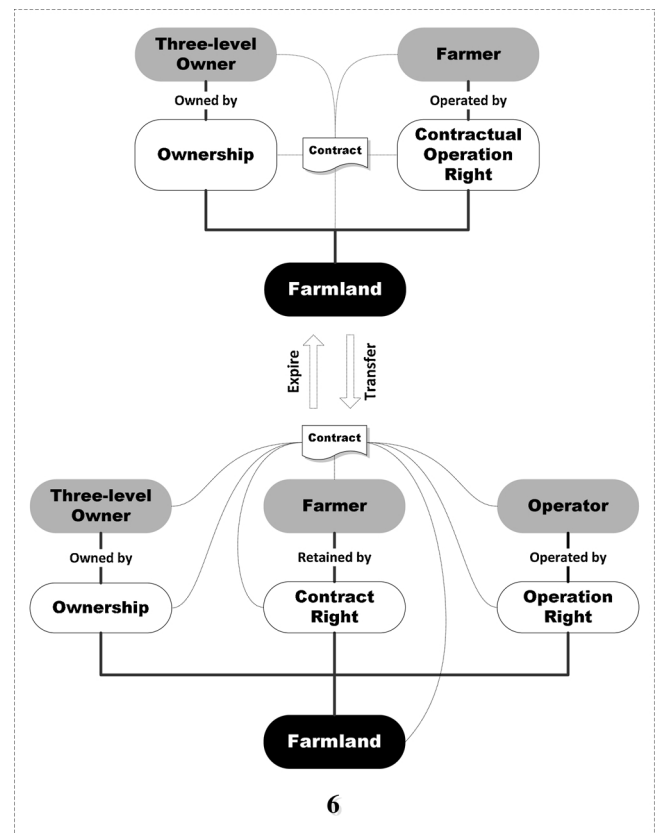


Fig. 4. Farmland Right System after the Third Land Reform.

5. Proposed farmland right system after the FTE reform

China’s rural land reforms since 1978 can all come down to a ‘trilogy mode’⁴ of practice first, policy guidance and legal underlining (Chen, 2014). In terms of the FTE reform, the pilot experiences have shown that this new system can solve problems like land fragmentation and diseconomies of scale for the tillage mode after the implementation of the HCRS and effectively promote the development of the agricultural economy in China (Sun, 2016). As related central policies developed and academic research has deepened, the farmland rights system after the FTE reform has been basically clear now: Starting from the BES, the contractual operation rights will be further divided into two different rights. Then, the farmland ownership, contract right and operation right will form a new farmland rights system, namely, the TES.

As mentioned in the previous section, the ‘people–land’ relationship has undergone considerable changes along the evolution of farmland institutions of China since 1949. Among the three parts of this relationship⁵, the object part has remained unchanged, and it also served

³ The first policy document released annually by the Communist Party of China (CPC) central committee is called the ‘No. 1 central document’. Since 2004, the No. 1 central document has been locked on the theme of ‘agriculture, rural areas and farmers’ for 11 consecutive years; thus, it can be considered a wind vane of the central government’s rural policies.

⁴ The basic logic of China’s rural land system reform is that after the farmers’ institutional innovation based on grassroots practice is recognized by the central government, it will be guided and promoted by policy documents and constantly improved in practice; then, it will be submitted to legislation for final refinement and response.

⁵ According to Henssen, J., 1995. Basic Principles of the Main Cadastral Systems in the World, Proceedings of the One Day Seminar held during the Annual Meeting of Commission 7, Cadastre and Rural Land Management, of the International Federation of Surveyors (FIG), Delft, The Netherlands., the ‘people–land’ relationship mainly consists of three parts: object (land), right and subject (people).

as the common object basis for the three rights in the TES. Based on Article 2 of the RLCL, the object here mainly refers to the farmland collectively owned and used by the peasants in the collective, and the purpose of land use should be constrained for agricultural production. As for the other two parts of this relationship (‘right’ and ‘subject’), new characteristics emerged after the FTE reform. Meanwhile, the necessary order of a legal system should be as follows: first, to define the subject; second, to figure out the right and interest to the object; and third, some other related issues, like obligations, transfer, mortgage and inheritance (Long, 2000). Based on this order, the following is a detailed description of these issues, including ‘rights and interests’, ‘subjects’ and ‘other related issues’ for the TES:

5.1. Farmland collective ownership

As shown above, since the foundation of new China, three land reforms have taken place in rural areas of China. During this process, the farmland rights system has evolved from the original private land ownership to collective land ownership. According to relevant laws, such as ‘the Constitution’, ‘General Principles of Civil Law’, ‘Property Law’, ‘Land Administration Law’ and ‘the RLCL’, the Collective is legally entitled to the collective land ownership. As was stipulated in the ‘Land Administration Law’, the subject of farmland collective ownership is the Collective. Concurrently, the current structure of collective ownership in rural China is the heritage of cooperatives and the people’s commune system stipulated in the 1962 ‘Sixty Articles’⁶ (Ho, 2008). By the early 1980s, the people’s communes had been dismantled. The original TLO farmland ownership structure of ‘commune–brigade–team’ had

⁶ The 1962 ‘Sixty Articles’ is popularly known as the abbreviation of ‘Revised Draft of the Work Regulations of the Rural People’s Communes’. This regulation is the basic document defining the ownership structure of collective land in rural China since 1962.

replaced by a new TLO structure of ‘town–village–village group’ (Ho, 2005). That is, three types of subjects are used for collective ownership now⁷: township (town) collective economic organisation, village collective economic organisation and villagers’ group (Ding, 2007).

Based on the provisions of ‘General Principles of Civil Law’ and ‘Property Law’, ownership refers to the owner’s rights to lawfully possess, utilise, benefit from and dispose of property. In other words, possession, utilisation, benefit and disposal are the four main types of interests for ownership. However, the farmland collective ownership in China has been incomplete since the second land reform. According to the provisions of the Opinion, ‘... in the formalization process of farmland tripartite entitlement reform, interests of farmland collective ownership, including contract letting, adjusting, monitoring and withdrawing, should be adequately protected’. Accordingly, interests of farmland collective ownership after the FTE reform will include contract letting, adjusting, monitoring right and withdrawing rights. As stated by the ‘Property Law’ and basic theories about property rights, these interests all can be attributed to the disposal type of interest (Liu, 2018).

5.2. Farmland contractual operation right

According to the basic principles of property rights, ‘jus in re aliena’ must arise from ‘jus in re propria’ (i.e. ownership). Therefore, other farmland rights in China should be derived from farmland collective ownership. That is, the relationship between contract rights and collective ownership is an important embodiment of the relationship between ‘jus in re aliena’ and ‘jus in re propria’ on farmland (Chen, 2012). Although farmland contract right is a kind of ‘jus in re propria’ derived from collective ownership, its effectiveness will be prioritised over the collective ownership (Cui, 2004). In accordance with the provisions of the RLCL, the derived farmland contractual operation right enjoys the rights to possess, use and benefit from the contracted land. As for the subject of farmland contractual operation right, it was stipulated in Article 15 of the RLCL that ‘The contractor of farmland household contract responsibility system should be the peasant household of the collective economic organization’. Thus, the subject is limited within the Collective, and the basic unit of the subject is a peasant household.

The central government’s regulations on the farmland contract term have undergone a gradual evolution. Prior to 1984, the contract term was approximately 2–3 years (Ding, 2007). To encourage farmers to increase investments and cultivate soil fertilities, the ‘No. 1 central document’ of 1984 clearly stipulated that ‘...to extend the term of farmland contract... Farmland contract term should be commonly more than 15 years’. Later, to further stabilise the farmland contractual relationship, in 1993, the central committee of the CPC and the state council issued a central policy named ‘Policy Measures on the Current Agricultural and Rural Economic Development’, which clearly pointed out that ‘after the original farmland contract term expires, it shall be extended for another 30 years’. Moreover, this statement was written into the ‘Land Administration Law’ (1995) and the RLCL (2003), respectively.

Article 10 of the RLCL clearly stipulated that ‘the state would protect contractors from transferring their farmland contractual operation right voluntarily and with compensation according to law’. Article 32 stipulates that four kinds of farmland transfer modes are used, namely, subcontract, lease, exchange and conveyance. However, different from the general land transfer, the transfer of contracted farmland will be subject to certain restrictions in accordance with the law: 1) The

contractor will have the right to independently decide whether and how to transfer the contracted farmland; 2) the contracted farmland will not be used for non-agricultural purposes; 3) the transfer term will not exceed the remaining term of the contract; and 4) the transferee will be a peasant household and the member of the collective economic organisation shall enjoy the priority. Article 36 of the RLCL also stipulated that the transfer fee will be determined by both parties through negotiation, and the transfer income will be returned to the original contractor.

The RLCL stipulated that the farmland contractual operation right is not allowed to be mortgaged. However, relevant researchers generally believe that mortgage of farmland contractual operation right should be allowed in the future to solve problems, such as farmers’ loan and financing difficulties (Ding, 2007; Ding and Tong, 2007). All these issues will be correspondingly improved in the FTE reform. As for the right of inheritance, according to the provisions of the RLCL, ‘Contractors shall inherit the contracted farmland’s benefits they are entitled to in accordance with the provisions of the Inheritance Law’. According to this provision, if one or part of the peasant household members dies during the contract period, then the inheritance of farmland contractual operation right will not occur because this household contractual relationship is based on the peasant household, not the individual peasant. If all the other household members die, then the last deceased member will receive the contracting income, but his successor will not inherit the contractual operation right. The contracted land will be withdrawn by the owner (i.e., the Collective) and the contractual operation right will be cancelled (Ding, 2007).

As mentioned above, Chinese farmers leaving their farmland for cities has become a common phenomenon. Actually, the transfer of farmland refers to the transfer of farmland operation rights, and farmers will retain the contract rights. This situation forms the institutional innovation of the FTE reform, as shown in Fig. 4.

5.2.1. Farmers’ contract right

In the Opinion, the central government proposed to divide the farmland contractual operation right into the right to contract for peasant households and the right to operate for operators. Among them, the right to contract is a kind of identity right enjoyed by farmers as members of the Collective and is the basis for farmers to guarantee their interests in land (i.e. collecting the transfer income). Current FTE policy discourse of the peasant household contract right, in fact, is basically equal to contractual operation right in prevailing laws (Sun, 2016). This scenario only arises because during the transfer of farmland, the contract right will be created and retained to the contractor.

In 2013, the third plenary session of the 18th Central Committee of the CPC published ‘Major Decisions of the CPC Central Committee on Comprehensively Deepening Reform’ (hereinafter referred to as ‘the Decision’). It pointed out that ‘farmers in the collective economic organization should be empowered rights to possess, use, benefit and transfer’. Based on the identity qualification of the Collective members, the contract right mainly includes the right to maintain contracting status, the right to collect transfer benefit, the right to collect expropriation compensations and the right to return the contracted land. The right to maintain contracting status is a membership enjoyed by the contractor as a member of the Collective. The contract right is guaranteed to remain unchanged after the separation of the operation and contract rights. The right to collect transfer benefit is one of the most important rights enjoyed by the contractor, ensuring that the contractor can obtain benefits or compensations without actually controlling the contracted farmland (Pan, 2014). In accordance with the provisions of the Property Law, the right to collect expropriation compensations ensure that farmers and the Collective can share the expropriation compensations. As for the right to return the contracted farmland, it is set for the citizenisation process of farmers under the current urbanisation background in China. According to Article 26 of the RLCL, the contractor can voluntarily return the contracted farmland and obtain

⁷ At present, there are some disputes about the definition of the subject of farmland collective ownership. According to the provisions of Article 10 of ‘Land Administration Law’ amended in 2004, there are three types of subjects: village collective economic organisation, villagers’ group and township (town) collective economic organisations.

compensations as soon as he/she becomes urban citizens.

5.2.2. Farmland operation right

The operation right is the right for operators to possess and use the farmland. Compared to the contract right, its subject does not have to be peasant households in the Collective, but any other kinds of agricultural operators outside the Collective. In 2013, the Decision formalises the separation of contract and operation rights at the central level and allows operators to mortgage their operation rights. This situation is conducive for operators to mortgage their benefit interest of the operation right, secure the financial investment and engage in modern agriculture production (Liu, 2014). The ‘No. 1 central document’ of 2014 stated that ‘the operation right can be mortgaged, thereby obtaining the financial support’. As regards the farmland operation rights, according to the Opinion, it can include the following interests: 1) to engage in agricultural production and obtain benefits; 2) with the consent of the contracted peasant households, the operator can improve the soil fertility and build related facilities; 3) under the same condition, the operator will have the right of priority to renew the lease of contracted land; 4) with the consent of the contracted peasant household and the Collective, the operation rights can be mortgaged according to law; 5) the compensation will be distributed in accordance with the contract if the contracted farmland is expropriated; and 6) the contracted peasant households will not hinder the operator from exercising their legitimate rights (Liu, 2018). In summary, the operation right includes the following interests: the beneficial right, transfer right and mortgage right, compensation right for expropriation and prior lease right.

Generally speaking, after about 70 years of institutional evolution, China’s existing farmland right system has basically formed. First, according to relevant laws and regulations, rural land (including farmland, rural construction land, homestead and so on) is legally owned by the Collective. It also forms the foundation of land right system in rural China. Secondly, as mentioned above, farmland contractual operation right, as a kind of usufruct, is derived from the collective ownership. However, it is different from traditional usufruct. Here, farmers obtain the contractual operation right based on their membership in the Collective. Finally, the contractual operation right will be transformed into the contract right and operation right when the farmland is transferred. Among them, the original farmer will retain the contract right, while the transferee will be entitled to the operation right. At this point, the proposed farmland right system consists of three types of farmland right: collective ownership, contract right (contractual operation right) and operation right (See Table 1).

Table 1
Summary of the Proposed Farmland Right System after the FTE Reform.

Farmland Rights	Object	Subject	Interests
Collective Ownership		The Collective	After the FTE reform, it is mainly embodied as the disposal rights.
Contractual Operation Right	Farmland in the Collective	Farmers in the Collective	After the FTE reform, if the transfer of operation rights does not occur or the operation right is expired, then it is mainly embodied as rights to possess, use and benefit.
		Farmers in the Collective	When the transfer of contracted farmland occurs, it is embodied as the right to maintain contracting status, the right to collect transfer benefit, the right to collect expropriation compensations and the right to return the contracted land.
		Operators (Farmers in/outside the Collective)	When the transfer of contracted farmland occurs, it is embodied as the beneficial right, transfer right and mortgage right, compensation right for expropriation and prior lease right.

6. Design of LADM based TES model for rural China

In accordance with the analysis presented above, we identify the current farmland rights system, the TES. To promote the formalisation process of farmland registration, transfer, mortgage and other activities, developing a corresponding farmland administration system that centres on the existing farmland rights system and combines with the requirements of registration, transfer and mortgage is necessary. However, for current land administration systems in China, a phenomenon of separation of different sectors arises (Zhuo et al., 2015), for example, urban–rural separation and separation of related departments. In the long run, an integrated land administration system is an inevitable direction for future development, at least for now. From this perspective, it is necessary to introduce a standardised modelling method here, so as to provide a basis for the next integration of separated systems. Thus, based on the TES describe above, we develop an LADM-based model for China’s farmland administration (mainly for farmland registration and cadastral management). It consists of the following (sub)packages.

6.1. Party package

Generally, the Party Package can cover all types of legal subjects in the TES. As depicted above, the legal subjects of farmland can be classified into three types: subjects of collective ownership, subjects of contractual operation rights (including contract rights) and subjects of operation rights. Specifically, the subject of ownership involves three types: village group, village and town. These three types have been covered in the code list of group party types. The other two types of subjects have been detailed in the code list of party type and party role type. Specifically, the first-level process of farmland transfer (that is farmland contracting) mainly occurs between the Collective and peasants in the Collective. At this time, as a party, the role of the Collective is a contractee. While, the peasants in the Collective is the contractor, usually in the form of household. Then, at the second-level of farmland transfer, it happens between the contractor and actual operator. Here, the role of contractor is a transferer, while, the operator is the transferee. According to the RLCL, the contractor (the subject of contractual operation right/contract right) should be peasant households in the Collective. While, the operator (the subject of operation right) can be a peasant in or out of the Collective. Fig. 5 shows the content of the party class and its associations with other basic classes, based on LADM.

6.2. Administrative package

The Administrative Package explores the legal part (i.e. interests in land) of the LADM and enables a detailed level of modelling interests in

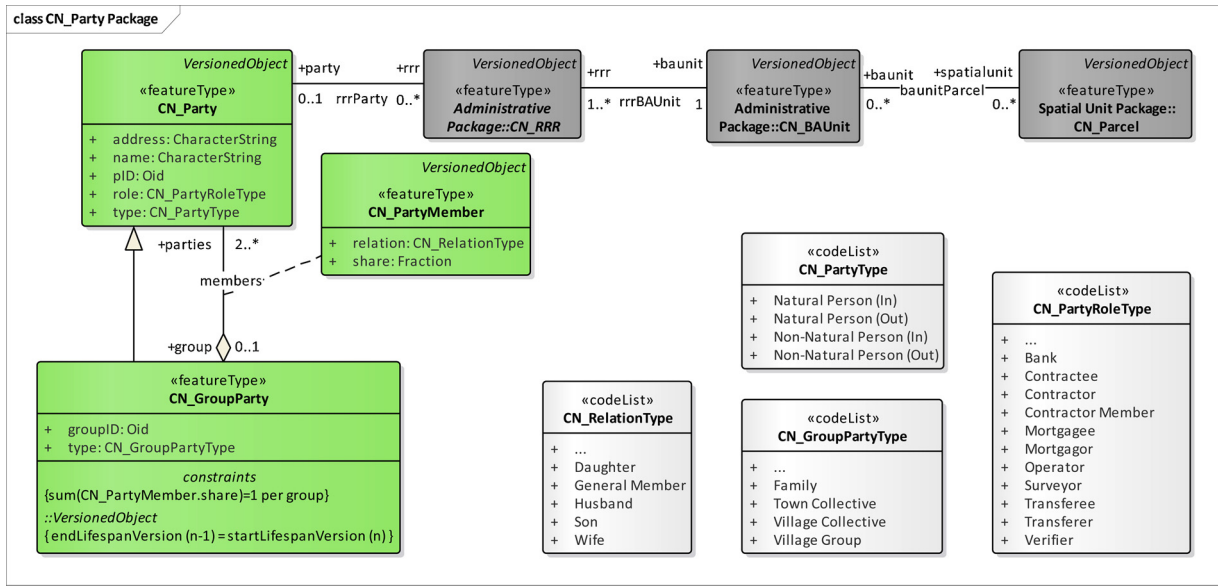


Fig. 5. Party Package in the TES Model.

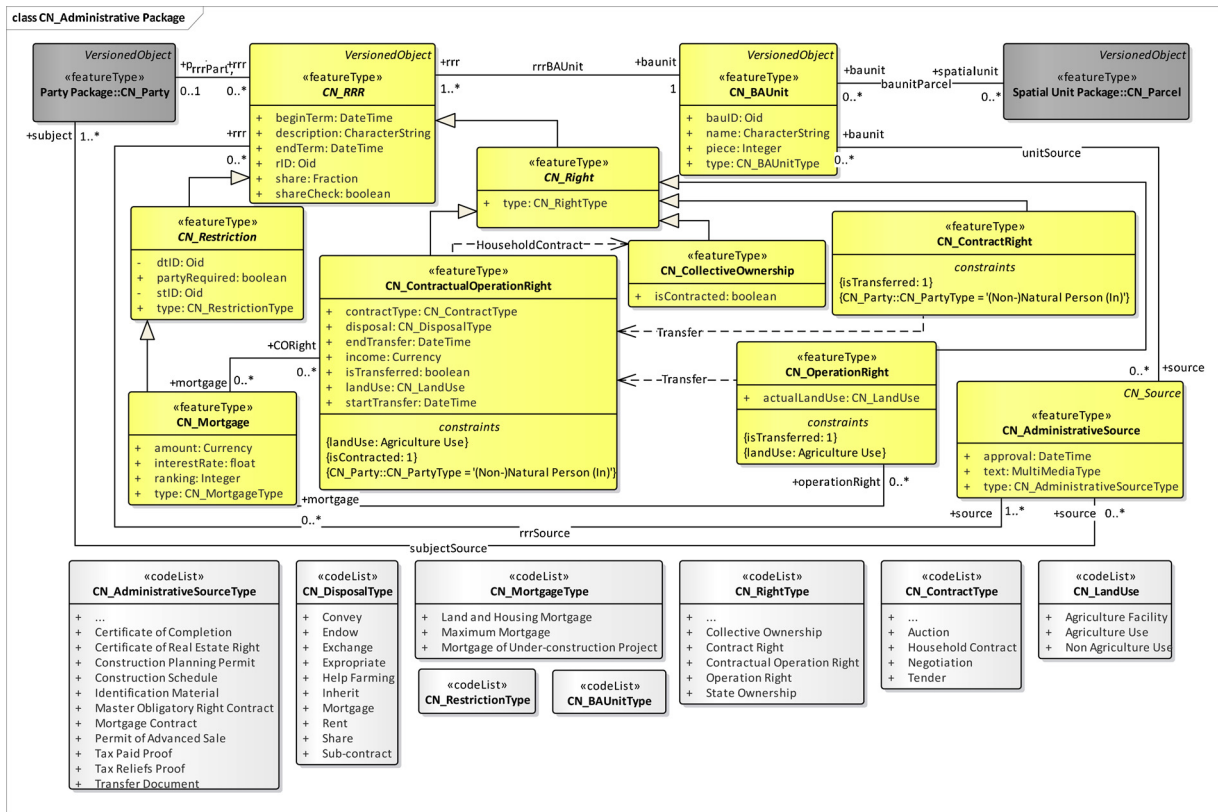


Fig. 6. Administrative Package in the TES Model.

land (Paasch et al., 2013). The main classes of the Administrative Package are basic classes RRR (with three specialisations: Right, Restriction and Responsibility) and BAUnit (basic administrative unit) (ISO/TC 211, 2012). According to the foregoing elaboration on the evolution of farmland institutions, China's farmland rights system has undergone three major land reforms. The first land reform is to collectivise the farmland ownership and establish the TLO structure (three types of ownership subjects are used: village group, village and town). This structure has been reflected in the Party Package. The second land reform is to separate the contractual operation right from collective

ownership. Once a peasant household in the Collective signs a contract with the Collective, the contractual operation rights will be separated from collective ownership. This situation can be depicted by a constraint of *isContracted* attribute (*isContracted: 1* means that the contract has been created). In addition, two other constraints are applied to the farmland contractual operation rights: 1) the use of contracted farmland should be limited to agriculture (the attribute of *landUse* is agriculture) and 2) the subject of contractual operation rights must be peasant households in the Collective (*CN_PartyType = (Non-)Natural Person (In)* and *CN_PartyRoleType = 'Contractor'*). The third land reform

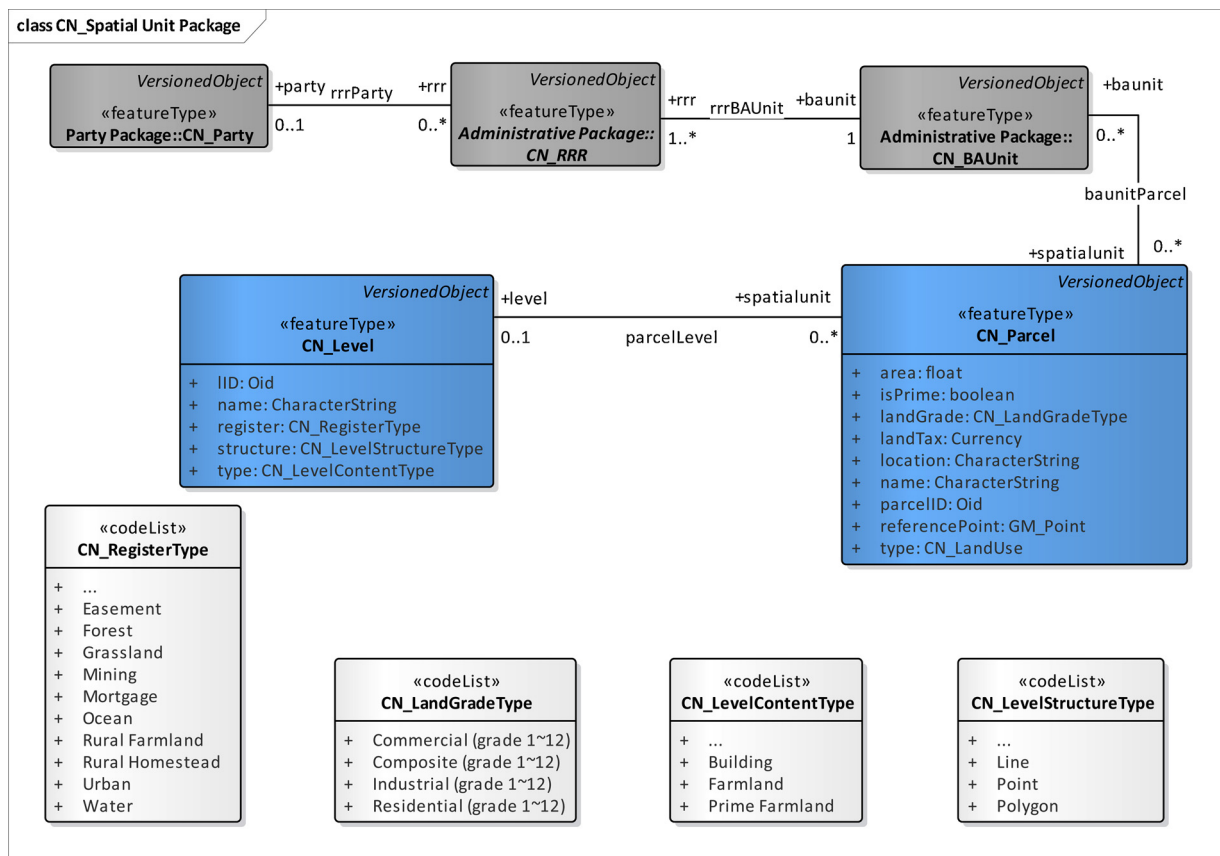


Fig. 7. Spatial Unit Package in the TES Model.

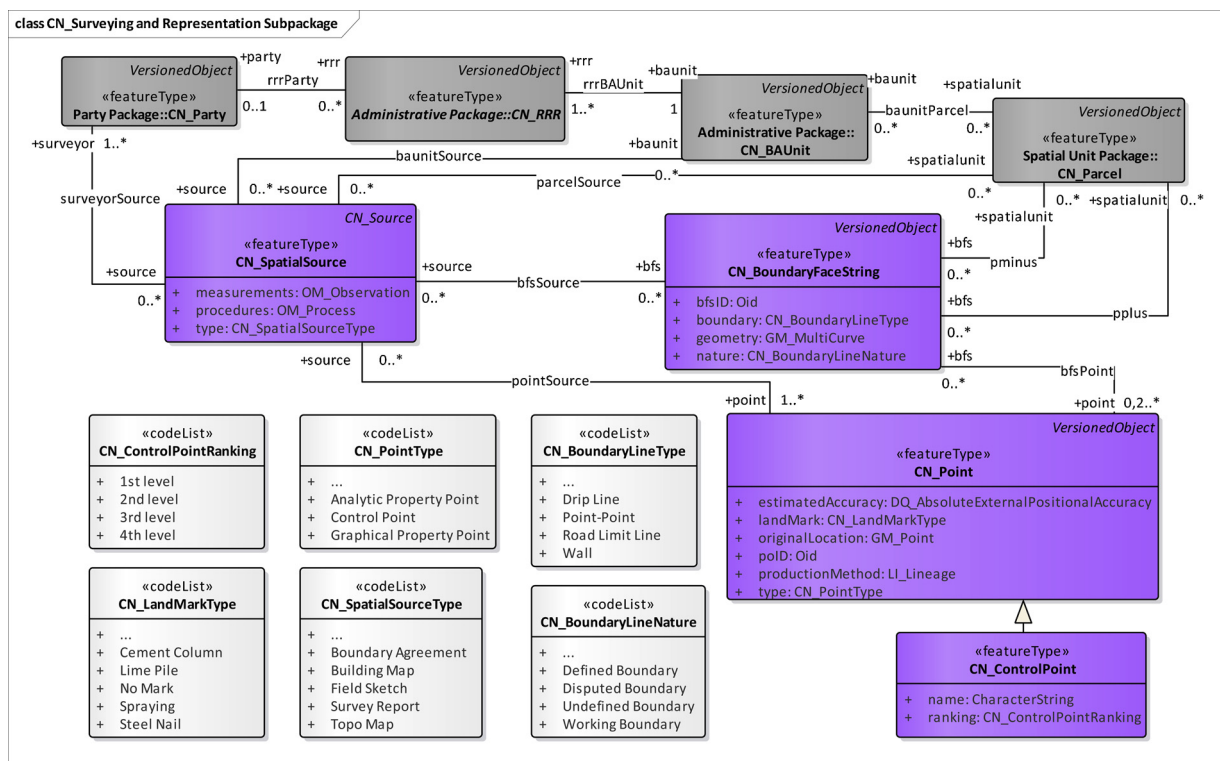


Fig. 8. Surveying and Representation Subpackage in the TES Model.

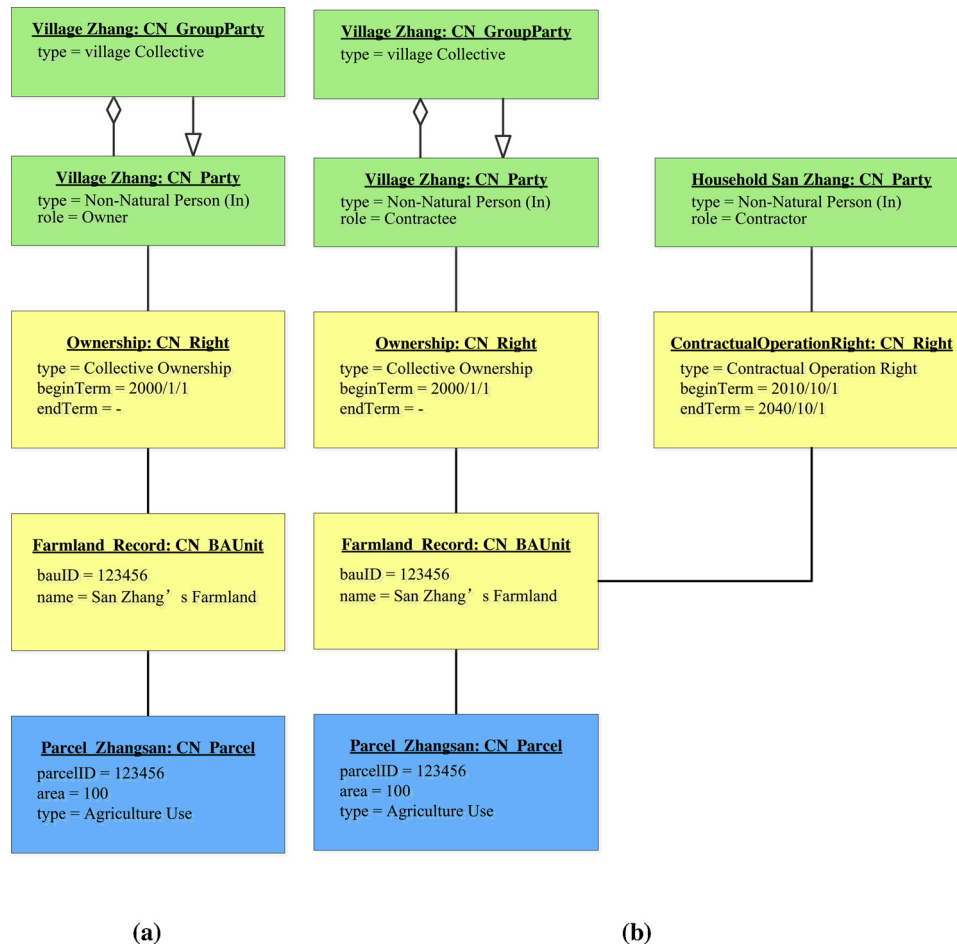


Fig. 9. Establishment/Expiration of Contractual Operation Right (From state ‘a’ to state ‘b’, it is the establishment process; While, from state ‘b’ to state ‘a’, it is the return process.).

realised the separation of contract right and operation right. However, the separation of the two rights should be established on the premise of farmland transfer (*isTransferred: 1*). Moreover, based on the provisions of relevant laws and regulations, mortgage rights can be set on the operation rights of farmland, as shown in the *CN_Mortgage* class in Fig. 6.

As is mentioned above in Table 1, the existing farmland right system in China consists of four types of rights: collective ownership, contractual operation right, contract right, and operation right. First of all, peasant households can obtain contractual operation right from the Collective through contracting. Then, the contracted farmer can further transfer its contracted farmland to another farmer, so as to realize the separation of farmland contract right and operation right. Therefore, in the model, the code list of *CN_RightType* includes collective ownership, contractual operation right, contract right, operation right and so on. Household contract is the common form of farmland contracting between peasant households and the Collective (See *CN_ContractType* in Fig. 6). As for the disposal method of farmland for peasant households, it is mainly reflected by the code list of *CN_DisposalType*, including convey, endow, exchange, lease and so on.

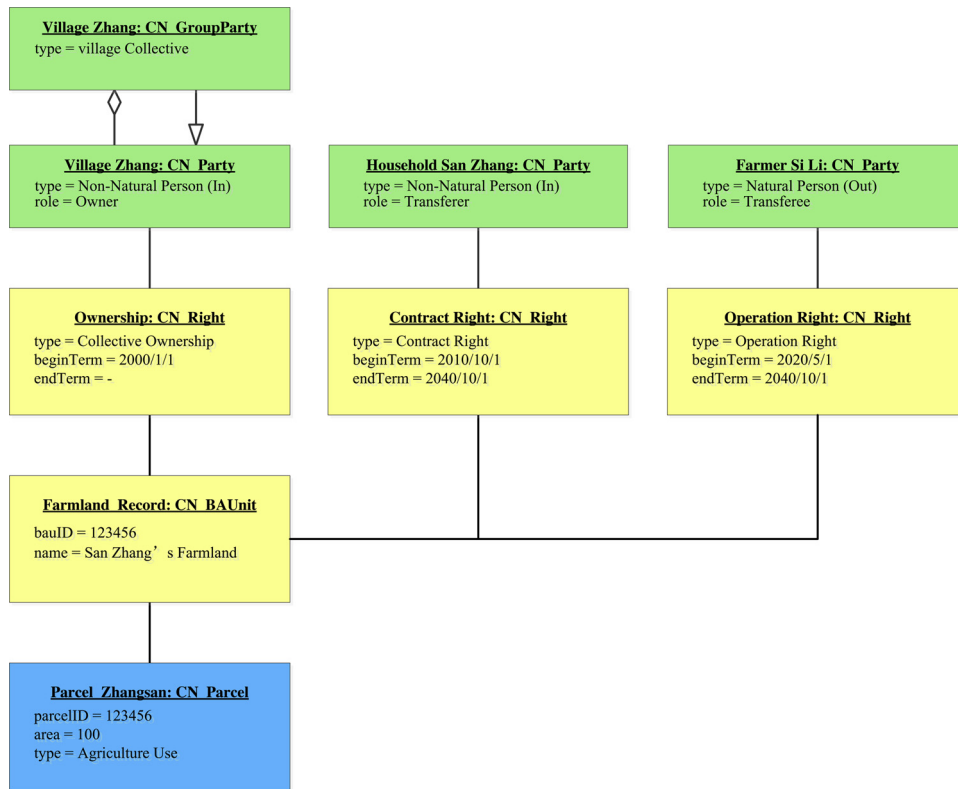
6.3. Spatial unit package & surveying and representation subpackage

The Spatial Unit Package and Surveying and Representation Subpackage mainly describes the object part of the ‘people–land’ relationship, and the corresponding surveying and representation contents (Lemmen, 2012). Based on the provisions of the RLCL, the rural contracted land here refers to the farmland collectively owned

according to law and used by farmers in the Collective. To strictly control the urbanisation process, avoid crowding out the high-quality farmland in the surrounding areas of the city and leave fertile farmland for future generations, the Central Committee of CPC proposed the concept of ‘Permanent Prime Farmland’ at the third plenary session of the 17th Central Committee of the CPC in 2008. That is, the usage of Permanent Prime Farmland cannot be changed, regardless of what happens. This situation is mainly reflected by the *isPrime* attribute of the *CN_Parcel* class in Fig. 7. For example, if the parcel is a piece of permanent prime farmland (i.e., *isPrime = 1*), then it is strictly prohibited to be occupied and converted into non-agricultural land uses. As regards the Surveying and Representation Subpackage, it is introduced to accurately measure boundaries of contracted farmland and obtain spatial sources correspondingly (Fig. 8).

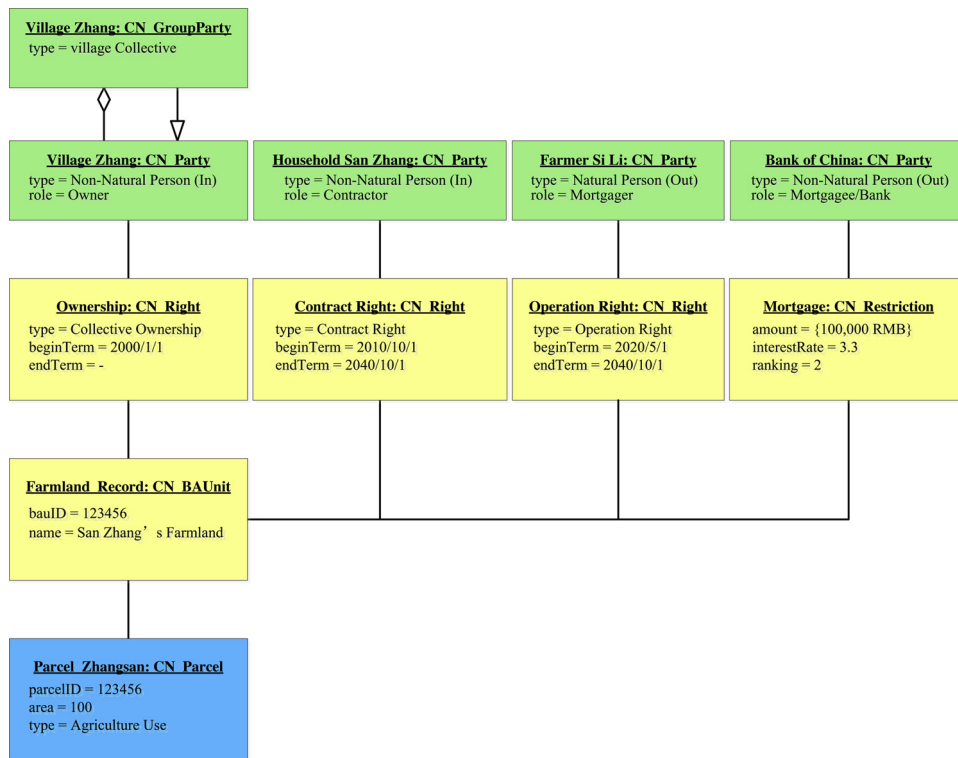
7. Instance level diagrams: TLO ⇌ BES ⇌ TES

To expound the relationships of farmland after the FTE reform, this section presents instance-level diagrams for the following scenarios. The first scenario is to elaborate the contractual operation rights between the Collective and peasant households in the Collective (from TLO to BES). Then, if the transfer of farmland occurs, the contract right and operation right will be separated and the operation right will be transferred to the operator (from BES to TES). Furthermore, the operation right can be mortgaged based on the contract and related laws (from TES to TES’).



(c)

Fig. 10. Transfer/Expiration of Farmland Operation Right (The transfer process is from state ‘b’ to state ‘c’; The opposite process is from state ‘c’ to state ‘b’).



(d)

Fig. 11. Mortgage of Farmland Operation Right.

7.1. Establishment/expiration of contractual operation right (TLO \Rightarrow BES)

Originally, the parcel (ID: 123456) is completely owned by Village Zhang (state 'a' in Fig. 9). After signing a contract between the *household San Zhang* and *Village Zhang*, the contractual operation right will be established and empowered to the *household San Zhang* (state 'b' in Fig. 9). This process (from states 'a' to 'b') is the establishment process of contractual operation rights for the peasant household in the Collective. In turn, when the term of contractual operation right expires, the contractual operation right will be returned to the owner/contractee, *Village Zhang* (from states 'b' to 'a').

7.2. Transfer/expiration of farmland operation right (BES \Rightarrow TES)

To realise the market-oriented allocation of farmland, the operation rights should be freely transferred to operators in/out of the Collective. Thus, the central government proposed the FTE reform to separate the contract and operation rights. Starting from state 'b' in Fig. 9, the farmland transfer process is to transfer the operation rights to the *operator Si Li*. The contract right will be retained for the *contractor San Zhang* (state 'c' in Fig. 10). And during this process, *San Zhang* assumes the role of transferer, while, *Si Li* is the transferee. When the transfer term expires, the operation rights will be returned to the contractor, *San Zhang* (From states 'c' to state 'b').

7.3. Mortgage of farmland operation right (TES \Rightarrow TES')

For operators, the goals of the FTE reform are to protect their operation rights and increase investments for modern agriculture, thereby ensuring agricultural efficiency and food security. Thus, the mortgage right should be protected to meet their financing needs. The mortgage is mainly set on the operation right. In this case, *Si Li's operation right* will be mortgaged to the *Bank of China*, and the *operator Si Li* can secure corresponding investment funds from the bank (Fig. 11).

8. Discussion and conclusion

The introduction of the LADM-based TES model is necessary to explore effective forms of collective farmland ownership by implementing collective farmland ownership, stabilising farmers' contract rights and liberalising farmland operation rights. In this study, we have systematically reviewed the evolution of farmland institutions in China since 1949 through the 'people-land' relationship. This situation shows that this evolution process can be generally divided into three phases based on three land reforms. The first phase is a collectivisation process of farmland ownership. From that moment on, it forms a three-level collective ownership structure for farmland. The second phase is to realise the separation of contractual operation rights and collective ownership by the HCRS policy. The third phase is to further separate the contract and operation rights from the contractual operation rights. On the basis of the results of the review analysis, we sort out the existing farmland rights system in rural China. The system mainly consists of four types of farmland rights: collective ownership, contractual operation right, contract right and operation right. The contractual operation rights will be established once the peasant household in the Collective signs a contract with the Collective. By contrast, the latter two types of rights will be established if the farmland is transferred from the peasant household to the operator.

After the farmland rights system is clear, we apply the LADM to develop the TES model. The application involves four (sub)packages: Party Package, Administrative Package, Spatial Unit Package and Surveying and Representation Subpackage. The Party Package mainly discusses the subjects of different farmland rights. The Administrative Package covers the relationships among farmland, including rights and restrictions. The Spatial Unit Package and Surveying and Representation Subpackage focus on the object part of the 'people-land'

relationship for farmland. Finally, we introduce some instances to detail the TES model. Correspondingly, these instances include the 1) establishment of contractual operation rights, 2) transfer of farmland operation rights and 3) mortgage of farmland operation rights. The conclusion of this investigation is that the adoption of LADM is a great opportunity to introduce the LADM standard model, improving and expanding the services to rural areas of China.

Future work and related activities include further modelling of the possibilities to include complete farmland rights, restrictions and responsibilities; further expanding the modelling range to cover all rural areas in China; and filling the land administration gap between rural and urban areas in China.

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