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Contract Design for "Enterprise+Farmer" Sharecropping Family Farms — A Comparison of Institutional Evolution in American and French Family Farms

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Abstract: In the process of agricultural modernization in the United States and France, land concentration and farm mergers have been carried out. However, due to the differences in the initial conditions of land resource endowment and the dependence on the path of institutional development, the two countries have formed different institutional evolution results. China's agricultural development urgently needs to take the road of scale. Based on the existing agricultural basic conditions, small and medium-sized family farms have become a realistic choice. However, compared with professional farmers in developed countries, small farmers in China have congenital shortcomings, and it is difficult to spontaneously grow into the main body of modern large-scale agricultural business. The "enterprise + farmers" proposed in this article is divided into a cooperation model. Enterprises provide all-round support to small farmers with their capital, technical and management advantages, providing an important growth path for small farmers to grow into family farms, which will become the main organizational form of China's agricultural modernization suitable for national conditions.

Keywords: Sharecropping Contract; Family Farm; Rural Land System; New Agricultural Management Entities

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1.Introduction

Like many developed countries, China has also implemented a phased policy of agricultural feeding industry to a certain extent in the process of industrialization. Cheap raw materials and low labor costs contributed to the rapid completion of industrialization. As a result, once the initial goals of industrialization were achieved, the Chinese government initiated a policy shift toward industry nurturing agriculture, placing agricultural and rural issues at the forefront of its agenda.

At the same time, advances in agricultural technology—particularly the rapid development of agricultural mechanization—have significantly boosted farming efficiency and continually expanded the effective boundaries of production scale, creating a strong demand for large-scale agricultural development. On the other hand, historical policies such as land reform, the People's Commune system, and the Household Responsibility System implemented since the founding of the PRC have led to fragmented farmland and a small holder-based production structure, which are ill-suited to the productivity requirements of modern scaled agriculture. Although institutional innovations such as land titling and transfer have addressed the issue of land supply for large-scale farming, there has yet to be a breakthrough in the form of agricultural operators and organizational models, making this an urgent challenge for agricultural development. The "enterprise + farmers" profit-sharing model

integrates the advantages of traditional household farming with modern scaled agriculture, and is poised to become a key organizational form suited to China's context on the path to agricultural modernization.

2.Literature review

The earliest economic research on sharecropping can be traced back to Marshall's Principles of Economics (1890). Using a tax-equivalence approach, he argued that under competitive wage conditions, share tenancy leads to an under-supply of labor and thus results in efficiency losses. Steven N.S. Cheung demonstrated that, in the absence of transaction costs, the efficiency of land use under sharecropping, fixed rent, and owner-cultivation is identical [1]. He later developed the theory of contractual choice, pointing out that under positive transaction costs and risk aversion, share contracts possess efficiency advantages [2]. Joseph Stiglitz found that when labor effort is difficult to observe, share contracts provide positive incentives and effective risk-sharing properties [3]. Avishay Braverman and Joseph Stiglitz, focusing on agriculture in less developed countries, argued that when farmers have informational advantages regarding production technology and inputs, share contracts offer efficiency benefits by enabling cost-sharing [4]. Clive Bel, Radwan All Shaban, Elisabeth Sadoulet, Alain de Janvry and Seiichi Fukui, Pierre Dubois, M. F. Ahmed and M. M. Billah, Nozilakhon Mukhamedova and Richard Pomfret, Wijaya through empirical analyses across different countries and regions, argue that sharecropping entails efficiency losses and have examined various factors influencing its efficiency[5-11].

Jean-Jacques Laffont found that when the tenant's output share decreases, agricultural production efficiency also declines [12]. Marc F. Bellemare research on reverse sharecropping between poor landlords and rich tenants，discusses a rationale for them that relies on weak property rights as well as the legal doctrine of adverse possession [13]. Debapriya Sen demonstrated that, under conditions of seasonal price fluctuations, sharecropping outperforms fixed-rent contracts [14]. Toritseju Begho et al. suggest that Nepalese sharecroppers' adoption of soil management practices is more context-dependent than uniformly hindered [15].

Liu Tingting et al. categorized contract farming in China into four models: leading enterprise-driven (enterprise+ farmer contracting), intermediary organization-coordinated (coordinated by cooperatives, etc.), cooperative-integrated (farmer self-organization with full-chain cooperation), and agribusiness-complex (enterprise-led integration of production, supply, and marketing) [16]. Liu Luhao et al. proposed a "social enterprise + farmers" contractual cooperation model, classifying it into decentralized, close-knit, and centralized types based on the degree of production service support, and further analyzed optimal pricing strategies under each model [17]. Lei Lixia and Zhang Yingliang, in their analysis of village-enterprise contract choices, found that when ex-ante bargaining costs are excessively high, share contracts offer efficiency advantages [18].

3.A Comparison of Institutional evolution in American and French Family Farms

The family farm is a modern agricultural micro-entity that has evolved from self-cultivating or small-scale farming households. It relies primarily on family members as its labor force, engages in scaled, intensive, and market-oriented agricultural production and operation, depends on agricultural income as the main source of household earnings, and adopts enterprise-style management. According to international agricultural census data, family farms account for 98% of all farms globally and supply at least 53% of the world's food [19]. The key advantage of family farms lies in their ability to effectively leverage the incentive effects of family labor and the benefit of zero supervision costs, making them particularly suitable for China's current agricultural reality, where small-scale farmers remain the mainstay of production.

Among the world's major agricultural producers, the United States and France stand out for their exceptional agricultural productivity, placing them at the forefront globally. This achievement can be largely attributed to the well-developed operational models and sophisticated management systems that family farms in both countries have refined through long-term evolution. China can draw on valuable lessons from the experiences of American and French family farms and, by integrating them with its national conditions and agricultural characteristics, explore and develop a family farm model tailored to its own context. Such an approach would contribute significantly to promoting scaled and highly efficient agricultural development in China.

3.1 Institutional changes of family farms in the United States

According to the 2022 USDA Census of Agriculture, there are approximately 1.61 million family farms in the United States, accounting for 85% of all farms (Table 1). The structure of U.S. farming exhibits a bimodal distribution, characterized by a

large number of small farms coexisting with a small number of large-scale operations. As shown in Table 1, small farms (less than 180 acres) make up 57.3% of all farms, while large and very large farms (more than 1,000 acres) account for 8.4%. Table 2 illustrates that in 2024, 78.9% of U.S. farms had a gross cash farm income (GCFI) of less than $100,000, operating on 25.9% of total farmland. In contrast, only 6.1% of farms reported a GCFI exceeding $1,000,000. These larger farms accounted for 35.8% of farmland and contributed to over 70% of total agricultural output, with an average farm size of 2,727 acres.

The coexistence of small and large farms in the United States, with a minority of large-scale operations dominating the agricultural industry, is closely tied to the country's historical land policies and has evolved through a prolonged institutional transformation. As early as the colonial era, American agriculture was primarily organized around self-sufficient family units, operating under a subsistence-based yeoman farmer model. Farms typically ranged from 50 to 500 acres and were extensively managed. After gaining independence in 1776, the United States gradually promoted the privatization of public lands. Starting in 1820, the government attracted settlers to develop the western territories by selling public lands at low prices. A critical turning point came with the passage of the Homestead Act of 1862, which played a key role in the formation of scaled family farms. Under this act, eligible individuals could claim 160 acres of western public land by paying a $10 registration fee and gain full ownership after cultivating the land for five years or by paying additional fees. This policy broke the monopoly of land speculators on western resources. Between 1850 and 1859, the federal government sold nearly 50 million acres of land, directly giving rise to 600,000 family farms.

Table 1 2022 US farms by legal status and size

Farms by legal status for tax purposes		**Numbers**	**Percentage**
Family or individual		1,609,899	84.7%
Partnership		125,457	6.6%
Corporation		127,648	6.7%
Other		37,483	2%
Farms by size		Numbers	Percentage
Small farm	1 to 9 acres	234,592	12.3%
	10 to 49 acres	566,912	29.8%
	50 to 179 acres	530,529	27.9%
Middle sized farm	180 to 499 acres	288,379	15.2%
	500 to 999 acres	120,456	6.3%
Large farm	1000 to 1999 acres	76,311	4.0%
Very large farm	2,000 acres or more	83,308	4.4%

other includes estate or trust, prison farm, grazing association, American Indian Reservation etc.

Data source : USDA 2022 census of agriculture

Table 2 2023-2024 US Farm Size by Economic Sales Class

Economics sales class	**Percent of total**				**Average farm size**	
	Number of farms		**Land in farms**			
	2023	**2024**	**2023**	**2024**	**2023**	**2024**
	(percent)	(percent)	(percent)	(percent)	(acres)	(acres)
$1,000-$9,999	48.3	48.1	8.5	8.5	82	82
$10,000-$99,999	30.7	30.8	17.7	17.4	267	263
$100,000-$249,999	6.6	6.6	11.2	11.4	785	799
$250,000-$499,999	4.6	4.6	12.7	12.8	1283	1289
$500,000-$999,999	3.7	3.7	14.3	14.2	1788	1789
$1,000,000 or more	6.0	6.1	35.5	35.8	2723	2727
Total	100.0	100.0	100.0	100.0	464	466

Percent of total may not add to 100 due to rounding.

Data source: USDA: Farms and Land in Farms February 2025

After the implementation of the Emancipation Proclamation in 1865, 4.3 million black slaves gained freedom. In 1866, the U.S. Congress passed the Southern Homestead Act, opening 46 million acres of public land across five southern states to freedmen. In coastal areas of Georgia and South Carolina, approximately 40,000 black families received land allocated at a standard of 40 acres per household. However, following President Johnson's "Amnesty Proclamation," most confiscated lands were soon returned to their original plantation owners who had sworn allegiance to the Union. Subsequently, across much of the southern plantation regions, both black and poor white farmers rented land from landowners (former plantation owners) through sharecropping or fixed-lease arrangements, forming family farms. According to the 1880 USDA Census of Agriculture, the average size of family farms in southern states reached 520 acres, 2.3 times larger than those in the North. This disparity reflected the transformation from the large-scale labor management model of the slavery era to family-based operations, while also laying the organizational foundation for future large-scale farming practices.

Between 1862 and 1900, the U.S. federal government distributed a total of 500 million acres of public land, of which only 80 million acres were allocated under the Homestead Act. The remaining 400 million acres were largely transferred through alternative channels: 25% were auctioned off to land speculators, while 75% were directly granted to state governments and railroad companies, who subsequently sold them to land speculators [20]. This speculative land acquisition intensified the process of land concentration. Coupled with agricultural mechanization and modernization, large-scale corporate farms emerged in the western United States. From the late 19th century through the 20th century, waves of farm consolidation persistently reduced the number of farms while expanding their average size, ultimately forming a production structure dominated by a small number of large-scale operations.

To summarize, the United States benefits from extensive plains, per capita arable land far exceeding the global average, and highly contiguous land plots, providing natural conditions conducive to mechanized farming. In terms of agricultural industry structure, it exhibits core characteristics of highly specialized division of labor and well-developed socialized services. The federal government has divided the country into 10 "agricultural production regions," forming segmented production zones where individual farms typically focus on producing only one or two types of agricultural products. Simultaneously, the agricultural socialized service system has continuously improved, with segments such as seed supply, machinery operations, processing, and storage outsourced to specialized organizations. This allows family farms to concentrate on core production activities, further enhancing economies of scale.

3.2 Institutional changes of family farms in French

France, with a land area of just 550,000 km², is the largest agricultural producer in the European Union and a major global exporter of agricultural products. According to the 2020 agricultural census data from the French Ministry of Agriculture, there are currently 390,000 farms in the country, with family farms accounting for 54.3% of the total. These are primarily medium-scale family-operated farms (Table 3, Table 4).

Table 3 Farm Size by Economic Sales class in France

Economic dimension	2010		2020		2023	
	numbers	Percentage	numbers	Percentage	numbers	Percentage
Micro-farms	149.0	30.4%	102.3	26.2%	76.2	21.8%
Small-scale farms	122.2	24.9%	97.4	25.0%	90.8	26.0%
Middle-scale farms	126.8	25.9%	97.9	25.1%	91.9	26.3%
Large-scale farms	92.0	18.8%	92.2	23.7%	90.7	25.9%
Total	490.0	100%	389.8	100%	349.6	100%

Data Source: Statistical and Prospective Service (SSP) of the Ministry of Agriculture and Food Sovereignty in France

Table 4 Farms in Major Agricultural Countries of EU

Item	EU	France	Germany	Italy	Poland
Farms(2020 number)	9 067 300	393 030	262 560	1 130 530	1301 490
Small farms (under €8,000 on average per year)(percentage of all farms in 2020)	65.6%	14.2%	15.8%	52.2%	63.9%
Family farms (percentage of all farms in 2020)	87.8%	54.3%	81.0%	90.4%	97.9%
Farm managers with full agricultural training (2020)	10.2%	38.5%	18.8%	6.8%	26.4%
Value of crop output (percentage of EU total in 2024)	100.0%	15.8%	12.4%	14.2%	6.3%
Cereals production (thousand tonnes in 2024)	257 700.61	53 554.31	39 052.4	14 185.51	34 345.78

Data Source: Eurostat, 2025-12-9

From a historical development perspective, the evolution of family farms in France began with the dissolution of the feudal land system. Prior to the French Revolution in 1789, 2% of the clergy and nobility controlled 35% of the land, while over 20 million peasants held only 65% of land resources. In 1793, the National Convention issued a land decree, which divided the lands of fleeing nobles, the royal family, and the church into small plots for sale. Peasants were allowed to pay in installments over ten years, and all feudal obligations were abolished without compensation. This enabled hundreds of thousands of landless peasants to gain land ownership. However, this reform also led to the issue of land fragmentation. According to the 1955 French agricultural census, among the country's 2.2857 million farms, 1.2772 million were small-scale farms under 25 acres, accounting for 55.9% of the total. Land fragmentation thus became a major obstacle to the scaling and modernization of agricultural development.

The path to agricultural scaling in France began with land consolidation and industrial redistribution. Starting in the 1960s, the French government implemented a series of policies to promote land concentration and the expansion of farm sizes. Driven by incentives such as agricultural subsidies, low-interest loans, and tax benefits for land transfer, the number of farms continued to decline while their average size gradually increased. Between 1955 and 1997, the total number of farms in France dropped from 2.2857 million to 679,800, a reduction of 70%, while the average farm size expanded from 40 acres to 103 acres, an increase of 157.5%. Throughout this process, the government avoided forced land acquisitions. Instead, it adopted an approach characterized by "voluntary transfer + cooperative integration," which optimized the allocation of land resources while preserving the central role of family farms.

In terms of agricultural industry structure, France operates under a dual-layer management system consisting of family farms and agricultural cooperatives. The establishment of the "Agricultural Mutual Assistance Association" in 1920 marked the institutional beginning of the agricultural cooperative movement in France. French agricultural cooperatives are mutual-aid and functional collaborative organizations voluntarily formed by farmers themselves. These cooperatives provide services such as shared agricultural machinery, bulk purchasing, collective sales, and technology extension to family farms. Over 90% of French farmers are members of agricultural cooperatives and adopt intensive farming practices. On this basis, family farms often specialize in the production of a single commodity, while processes such as planting, harvesting, and marketing are handled by specialized service organizations. This approach maintains moderate scale while enhancing production efficiency and commercial output.

3.3 Comparison and reference

During the process of agricultural modernization, particularly in large-scale grain production, the efficiency gains from economies of scale are crucial, as mechanization and technological advancement both rely on expanded operational size. Therefore, land consolidation and farm mergers played vital roles in the agricultural modernization of both the United States and France. However, due to differences in initial land resource endowments and the path dependency of institutional development, the two countries developed distinct institutional outcomes: the U.S. exhibits a bimodal structure with both large and small farms, though large-scale operations dominate; whereas France features a dual-layer management system

centered on medium-sized family farms and agricultural cooperatives.

In the early 20th century, sharecropping was widespread in the plantation regions of the American South. Large landowners divided their estates into small plots managed by individual families, with tenants paying a predetermined share of their harvest as rent. In contrast, France's agricultural cooperatives provided services such as shared machinery, bulk purchasing, collective marketing, and technical extension to family farms. This system represented an institutional innovation designed to capture economies of scale in mechanization, input procurement, sales, and technology adoption—all while maintaining medium-sized farm operations. Furthermore, in both the United States and France, farmers generally attained high levels of education, and agricultural support services were relatively well-developed. These factors also provided a solid foundation for the advancement of agricultural modernization in both countries.

4.“Enterprise + Farmer” sharecropping family farm model

China's agricultural development urgently needs to move toward scaling up production. Large-scale enterprise-based farms, such as state-owned farms in Northeast China and those under the Xinjiang Production and Construction Corps, have achieved scaled operations by leveraging unique historical contexts, vast land resources, and centralized management systems. However, due to various practical constraints, this model cannot be widely replicated across the country. Under current conditions, small and medium-sized family farms represent a more realistic pathway for agricultural development. Compared to professional farmers in developed countries, small-scale farmers in China face inherent limitations: a lack of initial capital accumulation and risk tolerance, relatively low educational levels that hinder effective adoption of new agricultural technologies, and underdeveloped agricultural social services. These factors collectively impede spontaneous evolution into modern, scaled agricultural entities. At this stage, the “enterprise + farmer” sharecropping model for family farms demonstrates significant efficiency advantages. Companies provide comprehensive support to small farmers through capital, technology, and management expertise, creating a viable pathway for small farmers to grow into family farms.

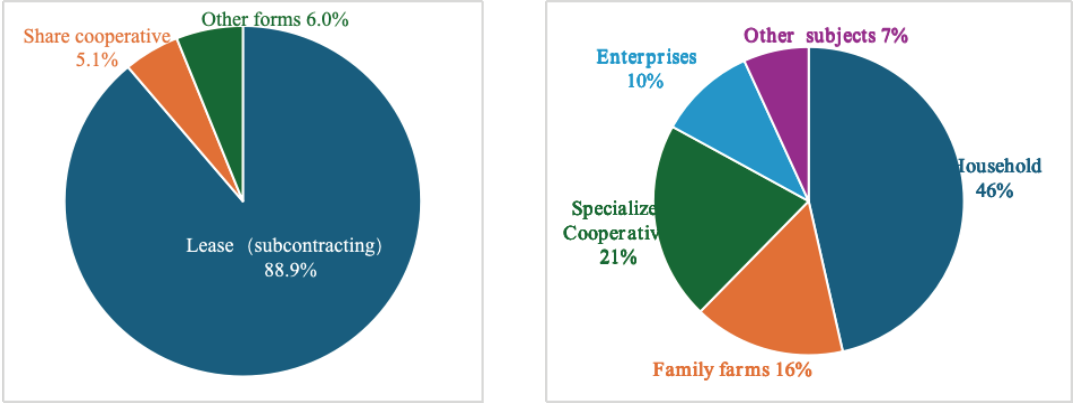
4.1 The practical constraints of the spontaneous transformation of small farmers into large-scale farmers

As shown in Figure 1, in China, 88.9% of land transfers occur through leasing arrangements. In terms of the destination of these transfers, 46% of the land is still flowing to small-scale farmers, making it difficult to achieve economies of scale. For small farmers to spontaneously transition into large-scale farm operators, they must overcome multiple barriers—including financing, technology, management, risk mitigation, and land consolidation. However, inherent limitations among small farmers and the lack of external support systems make it difficult for this transition to occur independently.

Capital constraints. Scaling up to family farms requires substantial upfront investments—such as land transfer rents, high-quality seeds and fertilizers, and large agricultural machinery—all of which involve long capital recovery cycles. Small farmers in China generally lack initial capital accumulation and are often reluctant to rely on loans for productive inputs. Compounding this issue, the limited availability of effective rural financial services further restricts their access to the necessary funds for both initial investment and sustained operational expenses in scaled production.

Figure 1 2023 Cultivated Land Transfer in China: Formation and Destination

a.Formation *b. Destination*



Data Source：Ministry of Agriculture and Rural Affairs

Limited technological adoption capacity. The transition to large-scale agriculture relies on advanced technologies such as precision planting, water-efficient irrigation, and intelligent monitoring. However, the overall education level of farmers in China remains relatively low, which restricts their ability to understand, operate, and adapt such technologies. In addition, underdeveloped agricultural social services and inefficient technical extension channels further limit small farmers' access to effective guidance, hindering the adoption of modern agricultural technologies.

Insufficient modern farm management skills. Operating a large-scale farm involves multiple aspects—including land use planning, production scheduling, cost control, quality assurance, and market forecasting—all of which require professional management expertise. Small farmers, accustomed to traditional decentralized production, often lack experience in integrated planning, standardized management, and data-driven decision-making. This frequently leads to inefficient resource use, high operational costs, and inconsistent product quality, ultimately undermining the viability of scaled agricultural operations.

Deficient risk management capabilities. Small farmers have traditionally relied on natural conditions for production and lack proactive risk management strategies. Agricultural production is exposed to significant external risks—including natural disasters, pests and diseases, and volatile market prices—and scaling up operations further amplifies these risks. Small farmers often lack both the technical capacity to mitigate natural risks and adequate insurance coverage, as existing agricultural insurance schemes suffer from low penetration and insufficient protection. When major risks materialize, many face severe financial losses that can take years to recover from, making it difficult to sustain large-scale operations.

Limited capacity for land consolidation. Small farmers typically lack the organizational strength and bargaining power needed to consolidate adjacent plots. Even when willing to expand, they often struggle to negotiate contiguous land transfers through independent consultation. Fragmented land holdings hinder the adoption of mechanized farming and standardized production practices, preventing the realization of economies of scale.

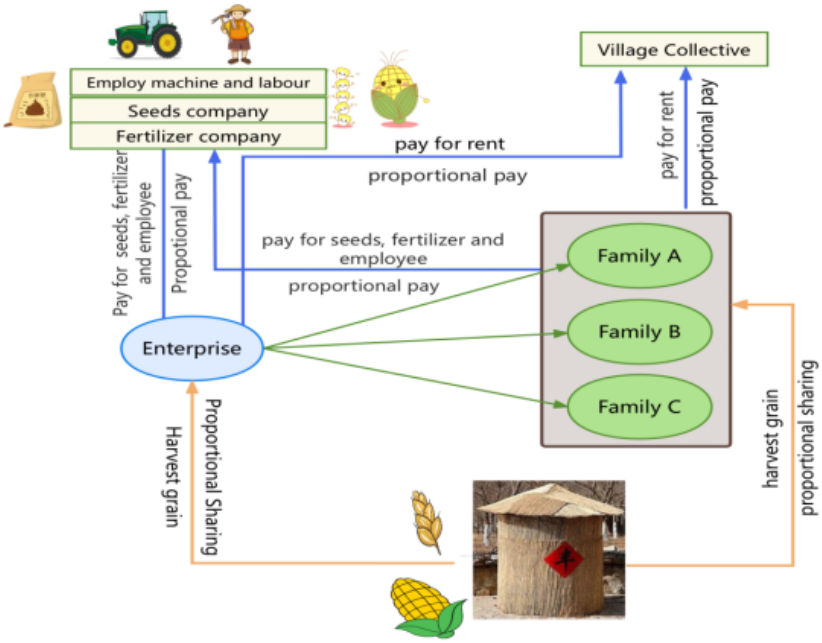
4.2 Contract design for "enterprise + farmer" sharecropping family farms

Given the fragmented nature of agricultural land in rural China, where land ownership belongs to the village collective and original contractors hold land contract rights, enterprises can obtain land management rights through leasing agreements. The village collective is responsible for consolidating small plots into larger contiguous areas and leasing them as a whole to enterprises. The land rent is determined by local market conditions and is prepaid before each planting season. Overall, land rents remain relatively stable; between 2018 and 2024, the average rent in rural areas of Shandong Province ranged from ¥1,000 to ¥1,200 per mu. Leveraging their information advantages, village collectives recommend suitable family farm operators to enterprises.

Enterprises and farmers enter into a sharecropping agreement where both parties agree on a revenue-sharing ratio in advance. At the beginning of the planting season, both sides contribute to covering the costs of land rent, seeds, pesticides, and fertilizers according to the predetermined ratio. The farmers is responsible for carrying out the farming activities, while the enterprise provides planting guidance and technical support. After the harvest, the revenue is distributed between the two parties based on the agreed-upon ratio (as illustrated in Figure 2).

Under the sharecropping agreement, the enterprise is responsible for the following functions: ① Developing a digital accounting APP to record farming costs in real time and conduct cost-benefit analysis, establishing a foundation for mutual trust and post-harvest revenue sharing. ② Providing professional guidance on seed, pesticide, and fertilizer selection based on soil conditions and climate, while leveraging centralized procurement to reduce costs. ③ Dispatching technical experts to offer on-site guidance and training to farmers, facilitating the adoption of new agricultural technologies. ④ Implementing unified storage and sales of harvested crops to enhance market prices. ⑤ Establishing brand management systems to control output quality (including pesticide residue levels) and capture brand premium value. ⑥ Managing risks by monitoring climate changes and market price information, employing hedging and other financial instruments to mitigate agricultural price risks. ⑦ Purchasing agricultural insurance to reduce production risks caused by climatic factors.

Figure 2 "Enterprise + Farmer" Sharecropping Family Farm



Under the sharecropping agreement, the farmer is responsible for the following functions: ① Utilizing the digital accounting APP to record all inputs such as seeds, pesticides, and fertilizers used during the farming process. ② Making full use of agricultural expertise to carry out farming activities (including planting, irrigation, and fertilization) primarily relying on family labour. ③ Hiring additional labour and leasing large agricultural machinery during peak seasons, with all incurred costs accurately recorded in the accounting APP. ④ Following the enterprise's unified guidance, training sessions, and quality management standards.

The sharecropping contract offers the advantage of enabling both parties to "combine their strengths, share costs, share risks, and distribute profits." Under this arrangement, both the enterprise and the farmer enjoy residual claimancy, which maximizes each party's effort without incurring supervision costs, thereby ensuring the contract's efficiency. The primary risks in agricultural production stem from climate variability and market price uncertainty, making it difficult to accurately predict future farming conditions. The sharecropping contract ensures that, despite the inherent incompleteness of contracts, both parties work together to respond effectively to unexpected events. Furthermore, the sharecropping contract and the underlying land lease are implicitly long-term in nature, which helps address challenges related to maintaining and improving soil fertility.

Conclusion

The "enterprise + farmer" sharecropping model is a production organization form well-suited for the early stages of agricultural modernization, aligning with the current basic national conditions of Chinese agriculture, which face inherent constraints. Under this sharecropping arrangement, the complementary advantages of both parties are realized: by linking effort to returns, farm operators are motivated to manage their farms more diligently, while enterprises provide technical support, capital investment, and enhance overall efficiency through unified procurement and marketing as well as technical services. Long-term cooperation between enterprises and farmers strengthens trust, reducing friction and costs associated with supervision, thereby yielding efficiency advantages. However, research on sharecropping contracts remains relatively scarce, particularly in-depth studies on the standards for determining the share distribution ratio are urgently needed.

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Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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