Scientific and Social Research, 2026, Volume 8, Issue 10
https://bbwpublisher.com/journal/SSR
Online ISSN: 2981-9946
Print ISSN: 2661-4332

Mechanisms and Implementation Pathways for Agricultural Socialized Services to Promote the Organic Integration of Smallholder Farmers with Modern Agriculture

Kuo Han, Junde Han

School of Economics and Management, Tianjin Agricultural University, Tianjin, China

Copyright: © 2026 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: Against the national context of "a large country with smallholder farming," smallholders remain an important component of China's agricultural system. Although they face constraints in capital, technology, information, and market access, their role in ensuring agricultural production and rural stability remains significant. Agricultural socialized services provide specialized support in land preparation, machinery use, technical guidance, crop protection, and product marketing, helping smallholders reduce production costs, improve efficiency, and overcome resource limitations. These services also promote the division of labor and resource sharing, facilitating smallholders' integration into modern agricultural production and industrial systems. Therefore, agricultural socialized services offer an important pathway for advancing agricultural modernization while maintaining smallholder farming.

Keywords: Agricultural socialized services; Modern agriculture; Agricultural production trusteeship; Organizational linkage

Online publication: November 25, 2026

1. Introduction

China's agricultural modernization is characterized by the coexistence of a large country and smallholder farming. Although smallholders face constraints in capital, technology, information, and markets, they remain central to maintaining agricultural product supplies and promoting rural development. Agricultural modernization therefore needs feasible ways to incorporate smallholders into the modern agricultural development system.

Current scholarship mainly focuses on three areas. First, research on pathways of integration: Guo Qinghai analyzes differences in integration among types of farm households based on their characteristics and operating patterns, while Luo Biliang argues from the perspective of the economics of division of labor that agricultural socialized services are a key way to connect smallholders with modern agriculture [1–2]. Second, research on production efficiency: Yang Caiyan et al. find that agricultural socialized

services can improve agricultural production efficiency [3]; Yang Zi et al. examine their contribution to technical efficiency [4]; and Zhang Yongqiang and Tian Yuan show that outcomes differ across service models [5]. Third, research on green transformation and income gains: Zhang Yingnan et al. demonstrate that agricultural input and plant-protection services can support the transition to green production, while Liu Zhengtao and Wen Tao examine the effects of connecting smallholders with modern agriculture on shared prosperity [6–7]. Research on agricultural production outsourcing, digitalized marketing systems, and organizational integration has further expanded the scope of socialized services.

Overall, existing scholarship provides important support for understanding how agricultural socialized services connect smallholders with modern agriculture, but several gaps remain. First, systematic reviews of outcomes such as production efficiency, green transformation, and household income are insufficient. Second, research on underlying mechanisms remains fragmented, and a unified analytical framework is needed. Third, the effects of farm size, part-time farming, digital awareness, and service type require further investigation.

Accordingly, this paper examines how agricultural socialized services promote deeper integration between smallholders and modern agriculture through resource allocation, technology diffusion, and organizational linkage, and proposes a corresponding research framework. To connect theoretical analysis with practical issues, it first identifies constraints involving service supply and demand, provider capacity, industrial-chain linkages, and digital adaptation, before analyzing the mechanisms and proposing implementation pathways.

In terms of service coverage, agricultural socialized services have reached considerable scale. According to information released by the Ministry of Agriculture and Rural Affairs, by the end of 2024, China had 1.111 million operating entities providing socialized services to nearly 93 million smallholder households. The annual service volume exceeded 22.9 billion mu-times, including 17.8 billion mu-times for grain and oil crops (**Figure 1**). These figures indicate that socialized services have established an important organizational foundation for connecting dispersed smallholders with modern agricultural production systems.

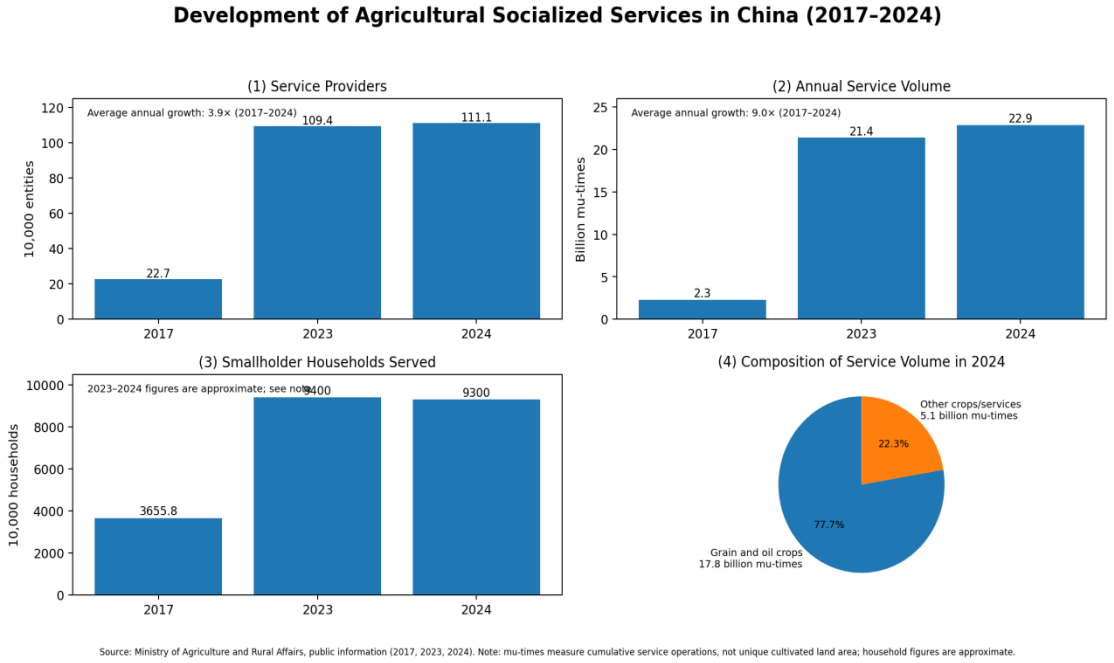

Figure 1. Development of Agricultural Socialized Services in China as of the End of 2024. Service volume is measured in mu-times, representing the cumulative coverage of service operations rather than the deduplicated area of cultivated land. Source: Department of Rural Cooperative Economy Guidance, Ministry of Agriculture and Rural Affairs (October 17, 2025)

2. Practical constraints

Agricultural socialized services are an important link between smallholders and modern agriculture, but expanding service coverage does not automatically achieve organic integration. In light of the research reviewed above, current constraints mainly concern supply-demand matching, the capacity of service providers, benefit-sharing across the entire industrial chain, and digital adaptation. These issues relate respectively to whether production factors can reach farm households smoothly, whether advanced technologies can be continuously disseminated, and whether smallholders can enter the industrial system and share benefits fairly.

2.1. Mismatch between service supply and smallholder demand

In some regions, agricultural socialized services do not fully match the actual needs of growers. First, regions differ in crop types, terrain, operational stages, and farming models, so standardized services cannot fully meet smallholders' diverse needs. Second, plot fragmentation, service prices, operating schedules, and service accessibility affect how easily farmers can obtain services. Although socialized services can lower the entry barriers for smallholders by coordinating machinery, labor, and other production factors, effective factor allocation still depends on accurately matching service supply with farmers' needs. Zhao Yang et al. find that the current agricultural socialized service system faces problems including poor supply-demand matching, limited capacity among service providers, and lagging digital transformation [8].

2.2. Service providers need stronger organization and professionalization

Some service organizations are small and have limited professional teams and equipment, making it difficult to provide continuous support across multiple production stages. Without a reasonable division of labor and coordination among providers, service handoffs may be poor, operations duplicated, and resources wasted, weakening the efficiency gains from specialization. Differences in providers' technical capabilities and operating standards can also affect the adoption of improved varieties, precision fertilization, and pest control. Providers therefore need not only to expand coverage but also to strengthen professional capacity, standardize procedures, and deepen coordination with grassroots agricultural extension agencies.

2.3. Weak benefit linkages between socialized services and the industrial chain

Some agricultural socialized services remain concentrated in production stages such as tillage, plant protection, and harvesting, with insufficient links to storage, processing, logistics, sales, and branding. Even when these services reduce production costs and improve operational efficiency, advantages at the production stage may not translate into sustained operating profits if farmers lack stable sales channels, market information, and order guarantees. Weaknesses in service agreements, order fulfillment, payment, and the division of rights and responsibilities may also reduce farmers' willingness to cooperate. Organizational linkage must therefore go beyond service transactions and extend along the industrial chain so that smallholders can obtain and share value-added returns fairly.

2.4. Digital development may create new capability gaps

Digital platforms can reduce the costs of service booking, machinery scheduling, and obtaining market information, but their effective use requires digital literacy and suitable devices. For older smallholders, those with limited digital skills, or households in areas with poor internet access, relying excessively on

online channels for service information, transactions, and technical guidance may create new barriers to participation. The effectiveness of digital technologies also depends on providers' data capabilities and the integration of online platforms with offline service networks. Digital upgrading should therefore balance efficiency gains with service accessibility and prevent some farmers from being excluded from new agricultural service systems.

These constraints are interconnected. Supply-demand mismatches and limited provider capacity affect the effectiveness of factor allocation and technical services; weak industrial-chain links impede the conversion of production efficiency into operating profits; and differences in digital literacy may exacerbate unequal access to services. The mechanisms of agricultural socialized services should therefore be further explained through factor allocation, technology diffusion, and organizational linkage, on the basis of which targeted implementation pathways can be proposed.

3. Analysis of the mechanisms

Through specialized division of labor, modern technology, and organized coordination, agricultural socialized services can ease smallholders' constraints in accessing production factors, applying technologies, and participating in markets, thereby helping them enter modern agricultural production systems. Their effects are reflected not only in lower costs and higher efficiency, but also in improved production arrangements, coordination, and benefit distribution. Specifically, agricultural socialized services operate mainly through three mechanisms: factor allocation, technology diffusion, and organizational linkage.

3.1. Factor allocation mechanism

Small agricultural operators have limited operating scale and often face high machinery purchase costs, insufficient agricultural labor, and low utilization of production resources. When dispersed farm households purchase large machinery, storage facilities, and specialized equipment individually, they generally cannot fully benefit from economies of scale, further restricting access to modern agricultural production factors.

By providing services such as plowing, planting, plant protection, harvesting, agricultural-input supply, drying, and storage, agricultural socialized services allow smallholders to access modern production capacity by purchasing services, reducing equipment investment and operating costs. Service organizations integrate machinery, professional personnel, and technical resources to improve utilization and lower the threshold for individual households to adopt modern production methods.

More fundamentally, agricultural socialized services shift production away from full-chain operations within individual households toward specialized division of labor. Farmers can outsource stages that are highly mechanized, labor-intensive, or technically demanding to professional providers while retaining flexibility in day-to-day management and production decisions. This separates farmland operating scale from service scale, allowing smallholders to share the efficiency gains of specialization without expanding their landholdings. Outcomes nevertheless remain constrained by plot fragmentation, service costs, and service availability.

H1: Agricultural socialized services promote deeper integration between smallholders and modern agriculture by optimizing the allocation of production factors, reducing costs across production and operating stages, and advancing specialized division of labor and cooperation.

3.2. Technology diffusion mechanism

Modern agricultural development depends on the adoption of advanced technologies such as improved seeds, intelligent machinery, green management, and digital technologies. Smallholders may lack technical knowledge, face high learning costs, and be unable to spread operational risks. Agricultural socialized services embed technical knowledge in actual production through agricultural extension, coordinated plant protection, mechanized farming, and standardized operations, reducing the costs of learning and applying technology.

When service providers operate across multiple growers and plots, they accumulate practical experience and improve performance through standardized procedures, enabling advanced technologies to spread in a more professional and organized manner rather than through fragmented promotion. Modern agricultural technologies are systemic, and optimizing a single stage may not achieve the desired outcome. By linking agricultural input supply, machinery operation, and production management, socialized services help transform isolated technologies into integrated technical pathways and improve coordination and standardization throughout production.

Technology spillovers can support green production and improve product quality. Services such as integrated pest management, precision fertilization, and green pest control can make agricultural input use more scientific and reduce unnecessary inputs. However, adoption outcomes vary with providers' technical capabilities, farmers' willingness to adopt, and market returns for green products. Technology dissemination should therefore be aligned with farmers' needs, production conditions, and market incentives.

H2: Agricultural socialized services strengthen the technological connection between smallholders and modern agriculture by reducing the cost of technology adoption, facilitating technology diffusion, and promoting standardized production.

3.3. Organizational linkage mechanism

Smallholders are often in a relatively disadvantaged position in collecting market information, controlling product quality, negotiating prices, and developing sales channels. Even if production efficiency improves, the resulting advantages may not be fully converted into operating profits without stable marketing channels.

Agricultural socialized service organizations can reduce smallholders' transaction costs of market entry through bulk purchasing, information sharing, order coordination, and post-harvest handling. Farmers' professional cooperatives, agricultural service enterprises, rural collective economic organizations, and other entities can coordinate dispersed farm households with the entire modern agricultural value chain, enabling them to participate in specialized industrial cooperation while retaining household-based operations.

When services extend to storage, processing, logistics, and sales, smallholders can participate more deeply in the division of labor along the industrial chain and improve marketing conditions. The core of organizational linkage, however, is not merely expanding market channels but ensuring that farmers fairly share value added along the chain. Standardized service agreements, clear responsibilities for order procurement, improved benefit distribution, and risk-sharing rules can reduce uncertainty and strengthen cooperation. Greater organization does not necessarily increase farmers' incomes if operations lack transparency, farmer participation is low, or contracts are not effectively enforced. Organizational coordination must therefore be combined with rights protection to transform temporary transactions into stable cooperation.

H3: Agricultural socialized services help establish stable organizational links between smallholders and modern agriculture by strengthening coordination, expanding participation along the industrial chain, and improving benefit-sharing mechanisms.

3.4. Mechanism synergies and contextual differences

Factor allocation, technology diffusion, and organizational linkage are not separate processes; together they form the system through which agricultural socialized services promote organic integration. Factor allocation provides resources for adopting advanced technologies; technology spillovers improve productivity and product quality; and organizational coordination supports production cooperation, market access, and the realization of returns. Working together, these mechanisms help smallholders move from passively receiving production services to becoming integrated into modern agricultural production and industrial-chain systems.

The effects also depend on farm size, the degree of part-time farming, digital literacy, and service models. Fragmented plots may raise providers' operating costs; farmers who combine farming with other work may prefer labor-saving services; and limited digital literacy may restrict the use of online services and market information. Service models also differ in factor integration, technological integration, and market-channel coordination. Targeted services should therefore reflect regional agricultural conditions and operators' needs so that the three mechanisms can work together effectively.

4. Implementation pathways

4.1. Improving the service supply system

A diversified and adaptable agricultural socialized service system should be developed in line with regional agricultural characteristics and operators' needs. In major grain-producing areas, priority should be given to plowing, planting, plant protection, harvesting, drying, and storage services. In hilly and mountainous areas and regions specializing in distinctive agricultural products, services should focus on suitable machinery, refined management, and specialized production. Single-stage services, multi-stage services, and full-process entrusted management should be developed to accommodate differences in production expenditure, labor input, and managerial autonomy among farm households.

Multiple service providers—including farmers' cooperatives, agricultural service enterprises, and rural collective economic organizations—should also be fostered to coordinate machinery, labor, and market resources and improve service supply. Publishing service prices, clarifying operating-quality standards, and standardizing contract procedures can reduce smallholders' information and transaction costs and ensure fair participation in the service market.

4.2. Strengthening technical service capacity

Grassroots agricultural extension agencies, research institutes, and socialized service providers should establish collaborative systems that integrate technical training, hands-on guidance, and standardized operations. Appropriate services should be provided for key stages such as improved-variety adoption, precision fertilization, and pest control. Embedding technical guidance in production processes can reduce smallholders' learning costs and increase the adoption and consistent use of modern agronomic technologies.

Agricultural socialized services should also be more closely integrated with green production. Services for integrated pest management, precision fertilization, and green pest control should be developed, and links

strengthened between green production, product-quality standards, targeted procurement, and branding to improve farmers' expected returns from adopting green technologies. Digital platforms can support service booking, machinery management, and market-information delivery. At the same time, offline service outlets, farmers' cooperatives, and grassroots agricultural technicians can help address limited digital literacy and integrate online and offline services.

4.3. Improving organizational cooperation and benefit linkages

Cooperatives and rural collective economic organizations should strengthen coordination, clarify service requirements, coordinate production, and provide market information to reduce the operating costs smallholders face when integrating into modern agriculture. Production-support services should be connected with storage, processing, logistics, and marketing services. Providers should cooperate with agricultural operators, specialized markets, and online e-commerce platforms to broaden sales channels for agricultural and sideline products.

Benefit-sharing mechanisms should be designed for different forms of cooperation. Service agreements should specify prices, quality requirements, and liability for breach; purchase-order agreements should define product standards, procurement volumes, and pricing mechanisms. Benefits should be distributed appropriately according to each participant's resource contributions and risk exposure. Dispute-resolution and farmer-participation mechanisms should also be improved to protect smallholders' right to information and legitimate returns and prevent imbalances in benefit distribution as the industrial chain expands.

4.4. Improving policy support mechanisms

Fiscal, financial, and public-service support should be strengthened, focusing on provider capacity, agricultural technology dissemination, and essential infrastructure. Service quality, farmer coverage, and actual implementation outcomes should be included in policy evaluations, rather than judging effectiveness solely by equipment ownership or service coverage area. Financial support should reflect providers' high equipment investment and seasonal operations, offering suitable financing while strengthening risk assessment.

Governance should improve service standards, contract management, and quality supervision, and establish systems for service evaluation, responding to needs, and resolving disputes. Grassroots government departments, agricultural extension stations, and village-level self-governing organizations should coordinate to provide smallholders with service information, technical advice, and contract guidance. A multidimensional evaluation system should assess integration through factor allocation, advanced technology adoption, coordination among stakeholders, and income generation by operators. Service models should be adjusted dynamically according to regional resource endowments and operators' actual needs.

In summary, agricultural socialized services promote the organic integration of smallholders with modern agriculture by grounding services in factor allocation, supporting them through technology diffusion, and safeguarding them through organizational linkage. Policy support and standardized governance can strengthen the sustainability of the service system and align improvements in agricultural productivity with gains in smallholders' incomes.

5. Conclusions and research prospects

Drawing on existing domestic research, this paper comprehensively reviews studies on how agricultural socialized services facilitate the organic integration of smallholders with modern agriculture and develops a unified theoretical framework.

First, agricultural socialized services are an important link through which smallholders enter the modern agricultural system. Their significance is not simply to replace household labor, but to enable smallholders to access modern production capabilities that they would otherwise struggle to develop independently through a refined division of labor.

Second, agricultural socialized services mainly operate through three channels: factor allocation, technology diffusion, and organizational linkage. These correspond to production factors, modern technologies, and industrial organization, and jointly promote smallholders' integration into the modern agricultural system.

Third, organic integration between smallholders and modern agriculture is not merely a matter of production efficiency. It encompasses multiple objectives, including productivity, green transformation, market participation, income growth, and benefit sharing. Future research should therefore move beyond single-outcome variables toward more comprehensive studies of integration.

Fourth, the effects of agricultural socialized services are heterogeneous. Operating scale, part-time farming, digital literacy, and service models all influence outcomes. Policies for agricultural socialized services should therefore pay greater attention to differences among farm households.

Future research can use micro-level survey data from farm households to empirically test H1, H2, and H3 proposed in this paper. Specifically, the depth of participation in agricultural socialized services can be treated as the key explanatory variable, and the breadth of smallholders' integration with modern agriculture as the dependent variable. Mediation models can test the mechanisms of factor allocation, technology diffusion, and organizational linkage, while interaction models can examine the moderating effects of farm size, part-time farming, and digital literacy. This would establish a complete research framework connecting theoretical analysis, hypotheses, variable design, empirical testing, and policy recommendations.

Disclosure statement

The authors declare no conflict of interest.

References

[1] Guo QH, 2018, Smallholders: Characteristics, Types, Operating Status, and Their Integration with Modern Agriculture. Issues in Agricultural Economy, 2018(6): 25–37. https://doi.org/10.13246/j.cnki.iae.2018.06.004

[2] Luo BL, 2020, Smallholder Farming, Functional Transformation, and Strategic Choices: On the "Third Path" for Integrating Smallholders with Modern Agricultural Development. Issues in Agricultural Economy, 2020(1): 29–47. https://doi.org/10.13246/j.cnki.iae.2020.01.004

[3] Yang CY, Qi ZH, Huang WH, et al., 2018, Do Agricultural Socialized Services Improve Agricultural Production Efficiency? An Empirical Analysis Based on a Three-Stage DEA Model. Journal of China Agricultural University, 23(11): 232–244.

[4] Yang Z, Zhang J, Zhu PX, 2019, Can Agricultural Socialized Services Help Smallholders Connect with

Agricultural Modernization? A Technical-Efficiency Perspective. Journal of Agrotechnical Economics, 2019(9): 16–26. https://doi.org/10.13246/j.cnki.jae.2019.09.002

[5] Zhang YQ, Tian Y, 2021, The Effects of Socialized Service Models on Farmers' Technical Efficiency. Journal of Agrotechnical Economics, 2021(6): 84–100. https://doi.org/10.13246/j.cnki.jae.20210615.001

[6] Zhang YN, Yin YS, Zhang KJ, et al., 2023, Can Agricultural Socialized Services Promote the Green Production Transition of Wheat Growers? Evidence from Household Surveys in Henan, Shandong, and Shanxi. China Population, Resources and Environment, 33(6): 172–181.

[7] Liu ZT, Wen T, 2025, The Shared-Prosperity Effects of Integrating Smallholders with Modern Agriculture. Journal of Agrotechnical Economics, 2025(10): 4–25. https://doi.org/10.13246/j.cnki.jae.2025.10.004

[8] Zhao Y, Wang MH, Zhao YF, et al., 2026, The Logic, Weaknesses, and Optimization Pathways of Agricultural Socialized Service Systems. Issues in Agricultural Economy, 2026(2): 72–83. https://doi.org/10.13246/j.cnki.iae.2026.02.003

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.