

enterprises, or village-level operating entities to farm households that still retain land rights and production interests. Recent studies have shown that such services can improve technical efficiency, encourage sustainable practices, raise land productivity, and help smallholders remain connected to modern production systems without being forced into a single large-farm model (Huan et al., 2022; Yang and Li, 2022; Cai et al., 2024). In other words, the key issue is no longer simply whether agriculture will mechanize, but how access to mechanization, agronomic guidance, drying, storage, and postharvest handling can be organized in a way that works for a landscape still dominated by small and medium-scale producers.

Zhejiang Province offers a particularly useful setting for discussing this problem. It is economically developed, highly urbanized, and agriculturally under strong pressure to modernize through quality and organization rather than through simple land expansion. Yet Zhejiang has also moved quickly to build modern agricultural service centers as regional infrastructure for socialized production services. Provincial policy now explicitly encourages service centers to provide integrated support such as full-process mechanized operation, centralized seedling raising, drying, storage, processing, training, and emergency services, while local districts like Shangyu have paired these broader goals with concrete support measures for rice machine transplanting, grain security, and high-quality rice development. This makes Zhejiang a good place to examine not only whether service centers exist, but how they actually function.

Although the literature on mechanization services and agricultural socialized services has grown rapidly, much of it still emphasizes outcomes such as yield, technical efficiency, fertilizer reduction, or machinery use. Those studies are valuable. They show that services matter. Yet they often say less about the concrete operational model of the service center itself: how functions are bundled, how teams are organized, how seedling, harvesting, drying, and training are coordinated, and how a center works as a regional institution rather than as a single business unit.

This study takes Mashan Agricultural Service Center in Shangyu District, Zhejiang Province, as a case to explore the operational model of modern agricultural service centers in socialized rice production services. By combining policy documents, recent academic literature, and practical case materials, the study examines the main service functions, organizational structure, and operational mechanisms of the center. Particular attention is given to how different service links, including seedling cultivation, machinery operation, grain drying, technical guidance, and postharvest management, are integrated into a coordinated service system. The purpose of this study is to summarize the practical experience of modern agricultural service centers, evaluate their role in improving rice production efficiency and supporting agricultural modernization, and identify the main challenges affecting their sustainable development. It is expected that the findings will provide useful references for the improvement of agricultural socialized service systems and the future development of modern rice production in China.

2 Development Background of Modern Agricultural Service Centers in Rice Production

2.1 Transformation of traditional rice production modes

Traditional rice production in China was historically built on household labor, manual coordination, and highly localized experience. That model worked under conditions where rural households had relatively abundant family labor, local production rhythms were strongly village-based, and the gap between production and postharvest treatment was much smaller than it is today. But the present situation is different. Rice still provides an essential foundation for food security, yet the typical household now faces much tighter constraints in labor availability, operation timing, and cost control (Tang et al., 2022).

Three changes stand out. The first is labor restructuring. Rural labor migration has reduced the number of people available for time-sensitive field work, and those who remain are, on average, older than before. Studies from Chinese grain-producing regions show that aging and labor transfer now directly shape technology demand, production organization, and outsourcing behavior in farm operations (Shen et al., 2024; Li et al., 2023). The second change is fragmentation. Even where total household-managed land is not extremely small, it may be split into multiple plots with different road access, irrigation conditions, and operational convenience. This makes coordinated fieldwork more expensive and reduces the efficiency of household-level machinery ownership. Recent analysis from Jiangsu suggests that both land-scale and service-scale operations matter, and that their