

informal local arrangements. Even where detailed real-time scheduling data are not publicly available, the institutional direction is clear: machine service is becoming more formalized, more trackable, and more closely integrated with district-level grain goals.

In the Mashan case, the existence of specialized mechanized operation teams and a multi-town service radius suggests that cross-regional machinery dispatch is already part of the center's operating model. This is not only an efficiency question. It is also a resilience question. When a center can move harvesting or drying support quickly across several towns, it functions as a regional buffer against timing shocks.

4.4 Grain drying and postharvest service model

Postharvest service is where many service-center models prove their real maturity. It is relatively easy to advertise mechanized harvesting. It is much harder to build an integrated system that can handle wet grain, unstable weather, drying queues, storage, and simple processing in a region with many small producers. That is why drying and postharvest service deserve special attention.

Rice quality is highly sensitive after harvest. Grain harvested at the right time can still lose value through delayed or improper drying. Review work on rice harvest losses shows that losses occur across the wider harvest process rather than at cutting alone, and that postharvest handling remains a major source of avoidable loss (Qu et al., 2021). From a wider sustainability perspective, this is a serious issue. Once land, fertilizer, water, labor, and energy have already been used to produce the crop, postharvest avoidable loss becomes a direct efficiency and environmental problem.

The service-center model addresses this by centralizing drying. A center can invest in dedicated dryers, create more stable drying routines, reduce dependence on household sun-drying, and offer grain safety and quality conditions that small farmers cannot easily achieve individually. The broader literature on rice greenhouse gas mitigation also indirectly supports this focus by reminding us that sustainable rice systems are not only about emissions in the field; they are also about reducing waste and improving total system efficiency (Qian et al., 2023).

Mashan's later expansion fits this model closely. The addition of eight dryers, greater single-batch drying capacity, a metal granary, and a processing line suggests that the center evolved from a primarily operations-based unit into a more complete postharvest service platform. This is a major operational shift because it means the center can connect rescue harvesting to stable postharvest management and then to value-added rice products.

4.5 Technical guidance and farmer training service model

Technical guidance is often treated as a soft or secondary function compared with machinery and drying, but in practice it is one of the most important ways a service center increases the quality and credibility of its services. Farmers do not only need a machine operator. They need advice about timing, seedling quality, pest risk, field management, drying decisions, and sometimes market expectations. If the center lacks a technical layer, it risks becoming a basic contractor rather than a modern agricultural service institution.

This issue has become even more important as digital and green production goals have expanded. Research on digital agricultural technology services in Sichuan shows that such services can increase farmers' willingness to adopt digital production technologies by expanding information channels, improving cognitive understanding, and increasing technology accessibility (Gong et al., 2024). At the same time, studies on sustainable agricultural practice adoption among Chinese smallholders suggest that socialized services can help farmers enter more sustainable production pathways when those services reduce knowledge barriers and improve access to practical support (Huan et al., 2022).

The logic applies directly to rice service centers. Training and expert guidance help in at least three ways. They reduce farmer uncertainty about service quality. They improve the agronomic quality of the operations themselves. And they help align service-center goals with green and standardized production aims. Technical guidance is therefore not separate from the operational model. It is part of how the model builds trust and effectiveness.