five-kilometer agricultural service circle so that support is delivered near the field instead of from distant, fragmented providers.

2.3 Main facilities and equipment configuration of the service center

Mashan's internal logic is structured around the most time-sensitive links in rice production: seedling cultivation, field operations, emergency harvesting, drying, storage, and simple processing. The center's original facilities included drying rooms, processing rooms, machine sheds, storage spaces, and a dedicated seedling center. A later expansion added 805 square meters of built area, eight more dryers, a 750-ton indoor metal granary, a 50-ton rice processing line, and additional service spaces needed for centralized seedling cultivation and machinery support.

This expansion raised the center's single-batch drying capacity to 400 tons and increased annual drying capacity from 10,000 tons to 18,000 tons. In practice, such post-harvest investment is one of the clearest signs that the center is operating as a full-chain rice service platform rather than as a simple machine dispatch unit. For high-quality rice, harvest is not the last decisive step. Drying conditions strongly affect the physical, processing, and nutritional quality of grain. Recent drying studies show that drying temperature, humidity, airflow, and moisture conditions influence cracking risk, whole-rice rate, germination quality, and postharvest stability, while scientific drying design can reduce losses and support quality retention (Li et al., 2024).

The center's equipment structure also reflects a service philosophy centered on coordination. Machinery and facilities are not isolated investments, but linked assets: centralized seedling equipment supports machine transplanting; harvest machinery feeds directly into drying; drying supports storage and processing; processing supports branding and marketing. This chain approach aligns with broader findings that agricultural mechanization becomes more productive when it is embedded in service systems rather than treated as a stand-alone farm input (Liu and Li, 2023; Ruan et al., 2025).

2.4 Service scope and service model for high-quality rice production

Mashan's service model as a "1+8" system built around full-process mechanized services and supported by drying and processing, centralized seedling cultivation, agricultural technical services, input delivery, machinery maintenance, agricultural study and training, product marketing, and storage and preservation. Four specialized teams have already been formed for mechanized operations, input delivery, technical services, and machinery repair.

They distinguish between a core neighboring service area and a broader regional service reach. The center provides "nanny-style" services for around 5,000 mu of nearby farmland and can deliver more than 50,000 mu-times of full-process mechanized services each year. The center provides integrated agricultural services to a 55,000-mu rice-and-wheat production area across seven surrounding towns and streets. Read together, these figures suggest a layered service pattern: intensive nearby support, combined with wider regional outreach through cross-village operation teams. Such a layered service structure is consistent with recent literature showing that service-scale operation and land-scale operation are complementary rather than mutually exclusive in promoting machinery utilization and reducing per-unit machinery costs (Zeng et al., 2025).

The service model is also important for how it deals with smallholder constraints. Smallholders do not necessarily need to own the entire set of modern inputs and machines. What they need is dependable access to those inputs and operations at the right time, with predictable service quality and reasonable cost. The best recent work on agricultural socialized services in China argues that these services matter most where they reduce timing constraints, improve technology accessibility, and bridge the organizational gap between small-scale farming and modern agricultural systems. Mashan's "service center + specialized teams + nearby and regional operations" model fits that logic closely (Cai et al., 2024; Zeng et al., 2025).

3 Application of Full-process Mechanization in Green and Efficient Production of High-quality Rice

The key value of full-process mechanization lies in coordination across production stages. A rice production system becomes truly "full-process" only when the earlier stages are designed to support the later ones, and when