

Original Research Article

Innovation of agricultural supply chain finance modes and application in financing for small and micro agricultural enterprises

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Abstract: Drawing on fieldwork and data in Shouguang, Zhoushan and Luohe, this study examines the financing challenges of small and micro agricultural enterprises (SMAEs). First, it reveals banks' reluctance to lend because of insufficient collateral, unverifiable data and poor credit history. Second, this study presents three innovative supply chain finance (SCF) strategies—Order financing, technology empowerment, and core enterprise credit enhancement. Third, it addresses two critical pain points (data fragmentation, risk transmission) with field-tested solutions. The model's real impact (e.g., reducing loan approval time from 15 days to 4 hours) demonstrates its value as a practical tool that directly tackles the financing needs for SMAEs.

Keywords: supply chain finance; small and micro agricultural enterprises; financing constraints; mode innovation; technology empowerment; risk management; inclusive finance

1. Introduction: The financing pain points of SMAEs are rooted in rural production

In a vegetable greenhouse in Shouguang, Shandong, Ms. Li—An experienced merchant—Was squatting beside her tomato seedlings, sighing. "I want to build two more greenhouses, which will cost 200,000 yuan," she said. "But all I have is a rural house, banks said 'homesteads can't be used as collateral.' It will take days and deal with complex interpersonal relationships to borrow money from relatives ." Ms. Li's dilemma is a microcosm of 62.3% of county-level SMAEs nationwide. A 2022 survey by the Ministry of Agriculture and Rural Affairs found that each SMAE lacks an average of 280,000 yuan annually, due to three main reasons: (1) insufficient qualified collateral (e.g., live fish in ponds or vegetables in greenhouses are not accepted by banks); (2) unverifiable operational data (e.g., supermarket supply orders cannot be authenticated); (3) a lack of credible credit history (e.g., lack of financial statements makes banks hesitant to lend). Can supply chain finance be the lifeline SMAEs desperately need? For Ms. Li, a vegetable farmer who struggled to get a loan for months, the answer is a resounding "yes." By shifting focus from "collateral" to "real transactions in the industrial chain," SCF directly tackles the pain points that kept her from expanding greenhouses.

2. Root causes of financing difficulties for SMAEs: Banks "dare not lend, cannot lend"

The real barriers of SMAE financing are not banks' unwillingness, but three agricultural specific challenges:

2.1. High operational risks

Agricultural production is vulnerable to natural disasters (e.g., northern drought caused 60% output loss for potato enterprises in Ulanqab in 2023), making banks cautious about lending.

2.2. Lack of acceptable collateral

Unlike industrial enterprises (which use fixed assets as collateral), SMAEs' main assets (live fish,

vegetables) are perishable and hard to value, leaving banks with no security.

2.3. Information asymmetry

Fragmented data (e.g., separate systems for feed factories and farms in Luohe) make it hard for banks to verify SMAEs' credibility.

3. Innovative SCF strategies: Using industrial chain transactions to build credit for SMAEs

Supply chain finance redefines "credit" by focusing on "real transactions" rather than "collateral." Three innovative models have proven effective in practice:

3.1. Order financing: Replacing collateral with real transactions for 4-hour fund disbursement

Shouguang's "Vegetable Basket" Wholesale Market—China's largest vegetable distribution center with over 2,000 merchants—Collaborated with a local rural commercial bank to launch "order financing" in 2022.

The model operates as follows (The mechanism is shown in **Figure 1**):

Eligibility: Merchants with at least three months of transaction history in the market and a stable supply relationship with supermarkets.

Data Integration: The market shares merchants' digital order data (e.g., supermarket supply contracts with electronic signatures and traceability features) with the bank in real time.

Rapid Credit Assessment: The bank evaluates creditworthiness using metrics like "historical order fulfillment rate" (e.g., 6-month overdue delivery rate)—Merchants with a 100% fulfillment rate receive approval within four hours^[2].

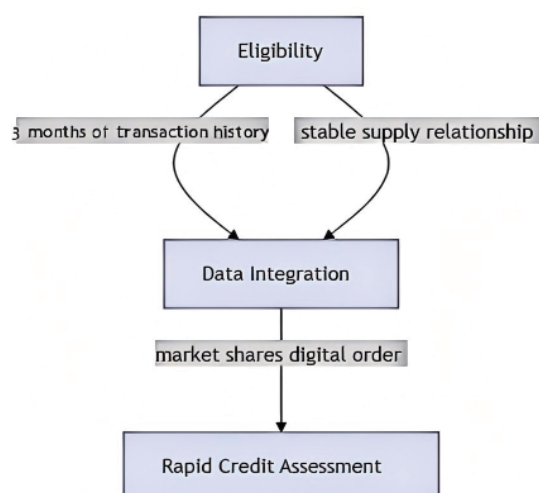


Figure 1. Order financing risk control node diagram.

Ms. Li's case vividly illustrates the effectiveness of this model. Last year, she required 200,000 yuan to buy tomato seedlings for her greenhouse expansion. She submitted her loan application at 8:00 a.m., the market promptly shared her 100,000-jin tomato supply order (with a local supermarket) with the bank. By 10:00 a.m., the bank had completed its credit assessment and approved the loan, and the funds were disbursed to her account by 2:00 p.m. "Getting a loan from the bank is quicker than asking relatives for help!" she noted with a smile.

To mitigate fund risk, a closed-loop management process is adopted. First, directed payment ensures loans are exclusively used for purchasing agricultural inputs (e.g., seeds, fertilizers) from pre-approved suppliers, preventing misallocation. Second, automatic repayment is enforced: once products are delivered to supermarkets, the supermarket transfers payment to the market, which then deducts the loan principal and interest and remits the amount to the bank. This cycle maintains strict control over fund flow, keeping the non-performing loan (NPL)

rate at 1.3%—Half the rate of traditional agricultural loans.

3.2. Technology empowerment: Using "IoT + blockchain" to make data visible and tamper-resistant

Zhejiang's "Yulian Tong" platform addresses SMAEs' "no data" problem by integrating *IoT and blockchain technologies*. *IoT devices* (GPS, temperature sensors) on fishing boats real-time monitor vessel position, catch weight, and cabin temperature (to ensure fish freshness). Blockchain technology stores transaction records (e.g., restaurant supply contracts) in an immutable ledger, eliminating data falsification risks^[3].

In 2023, "Yulian Tong" supported over 500 aquatic enterprises, increasing their financing coverage rate from 18.7% to 42.1%—Twice the traditional model's rate^[2]. A fisherman in Zhoushan said: "Previously, banks didn't trust our 'verbal orders'. Now, the platform's data prove our credibility."

3.3. Core enterprise increase credibility: Using core enterprise credit to expand financing access

COFCO Group, a leading agricultural enterprise, implemented a "two-way guarantee" model in the Heilongjiang rice chain: (1) Core Enterprise Guarantee: COFCO guarantees loans for signed cooperatives (e.g., if a cooperative fails to deliver rice, COFCO repays the loan); (2) Risk Reserve: COFCO contributes 5% of the total loan amount as a risk reserve to the bank.

This model creates a "win-win" for both parties: (1) For Cooperatives: Loan limits increased by 179% (from 50,000 yuan to 139,500 yuan on average); (2) For COFCO: Stabilized raw material supply reduces procurement costs, increasing ROI by 3.2 times^[4].

4. Pain points in innovation: Solving data silos and risk transmission

While SCF has achieved significant results, two key challenges remain:

4.1. Data silos: From "fragmented data" to "unified data sharing"

In the Luohe pig industry chain, 100+ feed factories, 500+ farms, and 20+ slaughterhouses use separate systems (e.g., Kingdee ERP for feed factories, Nongxinyun for farms). When a farm applies for a loan, it must export data from three systems (feed purchases, pig inventory, slaughter contracts), print them as paper documents, and submit them to the bank. The bank spends 3 days verifying these materials, with labor costs accounting for 34% of operational expenses.

The Guangxi Sugar Industry Alliance's "industrial data middle platform" solves this problem by integrating data from 21 sugar factories' purchase records, 142 growers' planting data, and 30+ agricultural material suppliers' supply data into a unified platform. After "desensitization" (removing personal information), the data are shared with banks, enabling real-time verification of growers' sugarcane yield, sugar factory purchase prices, and material costs. This reduces credit fraud rates by 63% and verification costs by 40%. The rapid penetration of online platforms confirms the improvement in efficiency (see **Table 1**).

Table 1. Comparison of application effects of online supply chain finance platforms (2021-2023).

Indicators	Traditional offline model	Online platform model	change rate
Single approval time	11.3 days	2.1 days	↓81.4%
Total financing costs	8.72%	6.15%	↓29.5%
Coverage of small and micro agricultural enterprises	18.7%	42.1%	↑125%

4.2. Risk transmission: Using "government-bank-insurance collaboration" to diversify risks

Supply chain finance risks have the ripple effect. If a small enterprise defaults, it may affect core enterprises and banks. Guangdong's "government-bank-insurance" model addresses this by sharing risks among three parties: (1) Government: Provides a risk compensation fund (30% of total loan amount); (2) Insurance Company:

Offers supply chain performance insurance (1.2–2.5% premium); (3) Bank: Bears the remaining 70% risk (after government and insurance contributions).

A vegetable cooperative in Guangdong benefited from this model: Last year, one heavy rain caused a 20% reduction in vegetable production, making it impossible to fulfill supermarket orders. Under the "government-bank-insurance" model, the government covered 40% of the loss, the insurance company covered 30%, and the cooperative only bore 30%, greatly reducing SMAEs' financial pressure^[5].

5. Conclusion

Supply chain finance's true effect lies in redefining agricultural credit. SCF doesn't focus on collateral, it takes real transactions into account. SCF doesn't rely on financial statements, it uses chain-wide data. SCF doesn't judge small businesses in isolation, it leverages core enterprises to boost credit. This shift isn't just theoretical, it's transforming lives. For farmers, this means they can get a loan in few hours instead of 15 days.

Innovative practices demonstrate its effectiveness:

Order Financing: Shortens approval time from 15 days to 4 hours;

Technology Empowerment: Reduces financing costs by 41%;

Core Enterprise Increase Credibility: Increases loan limits by 179%.

To make supply chain finance truly inclusive, three key tasks must be prioritized:

Establish Industrial Data Standards: Unify systems across agricultural enterprises to enable seamless data sharing;

Improve Chattel Pledge Registration: Legalize the registration and liquidation of live assets;

Incentivize Core Enterprise Participation: Provide tax breaks or subsidies to encourage core enterprises to support small businesses.

In the end, supply chain finance is not a "high-end financial innovation", but a "practical tool" that directly addresses SMAEs' most pressing need—Access to funds.

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