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Research on the Mechanism and Optimization Path of Inclusive Finance Empowering High-Quality Development of Gannan Navel Orange Industry

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Abstract: The Gannan navel orange industry has obvious brand advantages, but it still faces insufficient financing, a mismatch between financial products and production cycles, insufficient supply at the downstream end of the industrial chain, and imperfect risk diversification. This paper analyzes the empowerment mechanisms of inclusive finance from five aspects: financing constraints, business entity cultivation, technology application, industrial chain extension, and risk diversification. It proposes improving cycle-adapted products, developing industrial chain finance and digital finance, and strengthening the "credit + insurance + guarantee" mechanism, so as to promote a stable match between financial resources and the Gannan navel orange industry.

Keywords: Inclusive finance; Gannan navel oranges; Specialty agriculture; High-quality development

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1. Introduction

Inclusive finance provides appropriate and effective financial services to all social strata and groups at affordable costs. In recent years, it has continuously extended to agriculture, rural areas, farmers, small and micro enterprises, and new types of agricultural business entities. The State Council's *Implementation Opinions on Promoting the High-Quality Development of Inclusive Finance* explicitly require strengthening financial support for rural industrial development, developing agricultural supply chain finance, and focusing on supporting county-level advantageous and characteristic industries. Gannan navel orange is the most representative regional public brand and pillar industry in Ganzhou. It has formed a complete system integrating seedling cultivation, standardized planting, sorting and processing, cold-chain warehousing, and brand sales, radiating to multiple key counties in Gannan such as Xinfeng, Anyuan, and Xunwu, and driving hundreds of thousands of fruit growers to gain employment and increase income. However, the industry is characterized by long production cycles, large upfront investment, slow returns, and overlapping natural and market risks. Small and medium-sized growers, family farms, farmers' professional cooperatives, and small

and medium-sized processing and circulation enterprises generally face problems such as narrow financing channels, insufficient collateral, loan term mismatch, and weak risk protection, which constrain orchard renovation, green transformation, cold-chain construction, and deep processing extension. Therefore, merely studying whether finance can help fruit growers obtain loans is no longer sufficient. More attention should be paid to how financial resources enter different links of the industrial chain and how they promote industrial upgrading through business entities, technology application, and risk management. This paper analyzes how inclusive finance empowers the high-quality development of the Gannan navel orange industry and proposes corresponding optimization paths.

Existing research can be reviewed from two aspects: inclusive finance and the Gannan navel orange industry. Guo *et al.* defined inclusive finance as a financial system that can effectively and comprehensively serve all social strata and groups, emphasizing improving service accessibility through better financial infrastructure and providing convenient financial services to underdeveloped areas and low-income groups at lower costs [1]. Huang pointed out that Ganzhou's unique geography and climate have created the high quality of Gannan navel oranges, and the industry has become an important part of Ganzhou's agriculture; its high-quality development is of great significance for increasing farmers' income and promoting rural prosperity [2]. Huang and Qi believed that Ganzhou's fruit industry, dominated by navel oranges, has developed from a simple planting industry into an industrial cluster integrating fruit production, storage, preservation, processing, transportation, sales, and agricultural leisure tourism [3]. Liu *et al.* pointed out that the standard system of the Gannan navel orange industry urgently needs to be updated, and great attention should be paid to industrial safety [4]. Guo and Yao suggested accelerating technological progress, increasing the industry's outward orientation, and focusing on new sales models [5]. Xu and Wang proposed strengthening the regional targeting of policy support according to local conditions, promoting the cluster development of specialty agriculture, and injecting new momentum into enhancing county economic resilience [6]. Qiu used SWOT analysis to examine the strengths, weaknesses, threats, and opportunities of Gannan navel orange development, and suggested extending and improving the industrial chain to enhance comprehensive product benefits [7]. Overall, existing research has clarified the development foundation, industrial value, and core problems of the Gannan navel orange industry, and has constructed an optimization system from multiple dimensions such as technology, market, policy, and industrial chain. However, it has not yet combined the empowering characteristics of inclusive finance to deeply explore the supporting role of financial services in helping the Gannan navel orange industry overcome development bottlenecks, improve the industrial system, and extend the industrial chain, thus leaving room for exploration in subsequent research.

2. Current development status of the Gannan navel orange industry

2.1. Large industrial scale and prominent regional brand advantages

With several counties in Ganzhou—such as Xinfeng, Xunwu, and Anyuan—as core production areas, the planting area and annual output have consistently ranked among the top in China. Gannan navel orange has become the most influential regional public brand for citrus in China and has high brand value.

From the data in **Table 1**, it can be seen that the planting area of Gannan navel oranges continued to increase from 2016 to 2025, rising from 1.54 million mu in 2016 to 1.90 million mu in 2025. The yield also continued to increase, growing from 1.07 million tons in 2016 to 2.12 million tons in 2025, and the brand

value continued to rise. All of these reflect that the scale of the Gannan navel orange industry has continued to expand, its brand value has continued to grow, and its brand advantages are prominent. As a national geographical indication agri-product, Gannan navel orange has played a significant role in promoting rural industrial revitalization [8].

Table 1. Data on planting area, yield, and brand value of Gannan navel orange, 2016–2025

Year	Planting area (10,000 mu)	Yield (10,000 tons)	Brand value (100 million yuan)
2016	154	107	-
2017	155	108	-
2018	156	117	601
2019	163	125	675.41
2020	170	138	-
2021	175	150	681.85
2022	189	159	686.37
2023	193	185	691.27
2024	194	193	691.4
2025	190	212	692.94

Source: Ganzhou Municipal Government Website and Ganzhou Municipal Agriculture and Rural Affairs Website

2.2. Diversification of business entities

Industrial business entities include dispersed smallholder farmers, family farms, farmers' professional cooperatives, leading navel orange processing enterprises, and socialized service organizations. The capital needs of different business entities differ significantly: farmers have small, short-term capital needs, while leading enterprises require large, medium- and long-term capital investments in cold-chain and deep-processing projects.

From the current situation of industrial development (**Table 2**), the business entities in the Gannan navel orange industry have already shown clear characteristics of diversification, large-scale operation, and industrial chain development. For example, previous statistics from Ganzhou City showed that the city had 4 national-level, 36 provincial-level, and 70 municipal-level leading fruit industry enterprises, more than 1,200 fruit industry cooperatives, and over 100 fruit industry family farms, with more than 90% of fruit growers having joined cooperatives.

Table 2. Data on types of business entities in the Gannan navel orange industry

Business entity	Main types	Main role in the industry	Main funding needs
Farmers / Fruit Growers	Ordinary Fruit Growers and Large-Scale Growers	Navel Orange Production and Primary Operation	Funds for Seedlings, Agricultural Inputs, Land Transfer, Agricultural Machinery, and Routine Production
Family Farm	Navel Orange Family Farms and Large-Scale Growers	Large-Scale and Standardized Production	Orchard Construction, Facilities and Equipment, Technological Upgrading, and Working Capital
Farmers' Professional Cooperative	Navel Orange Professional Cooperatives and Cooperative Unions	Organizing Production, Unified Procurement, Technical Services, and Sales	Procurement of Production Inputs, Warehousing, Purchasing, and Order-Based Operations

Leading Enterprises in Navel Orange Industrialization	Planting, Processing, Sales, and Brand Enterprises	Processing, Warehousing, Logistics, Brand Marketing, and Industrial Chain Integration	Fixed Asset Investment, Equipment, Raw Material Procurement, and Supply Chain Financing
Socialized Service Organizations	Agricultural Service Companies, Plant Protection Organizations, Logistics Enterprises, etc.	Agricultural Input Supply, Plant Protection, Picking, Transportation, Warehousing, and Other Professional Services	Agricultural Machinery and Equipment, Drones, Cold Storage, Transport Vehicles, etc.

Source: Ganzhou Municipal Government Website

2.3. Gradual extension of the industrial chain

In the past, the main source of income for Gannan navel oranges was fresh fruit sales. Today, the upstream, midstream, and downstream segments of the Gannan navel orange industrial chain are developing rapidly. The upstream pre-production segment includes socialized services (orchard planning, pest and disease prevention and control, and technical guidance), agricultural input supply (fertilizers, pesticides, irrigation, and agricultural machinery), and seedling breeding (variety selection and virus-free seedling cultivation). The midstream mainly involves the construction of standardized orchards and smart orchards. The downstream develops cold-chain warehousing and logistics, with channels divided into online and offline channels that ultimately reach consumers. The Gannan navel orange industrial chain is continuously improving and extending in the course of economic development.

2.4. Characteristics of financing needs

The navel orange industry has a long investment-return cycle, and capital investment spans multiple years. Business entities therefore hope to obtain medium- and long-term agriculture-related loans that match their needs. However, the traditional credit model imposes high collateral requirements, and many farmers lack eligible collateral, resulting in poor access to financing.

3. Mechanism of inclusive finance empowering the high-quality development of the Gannan navel orange industry

3.1. Production side: Alleviating capital constraints in the planting segment and promoting standardized planting

Business entities in the Gannan navel orange industry are mostly smallholder farmers, family farms, and small cooperatives. They generally have limited self-owned capital, insufficient eligible collateral, and relatively narrow financing channels, so orchard renovation and routine inputs are easily constrained by cash flow turnover. Taking into account the planting cycle and input characteristics of navel oranges, inclusive finance has launched products such as small-sum credit loans for farmers and special loans for navel oranges, lowered collateral and guarantee thresholds, and mainly grants credit based on credit status, planting scale, and years of operation, thereby alleviating the problems of difficult, expensive, and slow-approval financing. The funds are directed to links such as seedling procurement, old orchard renovation, integrated water and fertilizer management, green agricultural inputs, and pest and disease control, thereby ensuring stable production. After capital constraints are eased, standardized orchard renovation can be advanced; processes such as planting density, fertilization, and prevention and control tend to be unified; extensive planting gradually shifts to standardized management; fruit shape, sweetness, and appearance consistency improve; and the proportion of

defective fruit declines. This improves product quality at the production source and provides a foundation for the scaled and standardized development of the industry.

3.2. Midstream of the industrial chain: Supporting processing and cold-chain development to extend the industrial chain

After navel oranges are harvested, midstream processing and warehousing are important links that connect production with sales and enhance industrial returns. However, intelligent sorting, cold-chain warehousing, freshness-preservation storage, and deep-processing production lines require large investments and have long payback periods, making it difficult for cooperatives and leading enterprises to complete upgrades relying solely on their own funds. Inclusive finance provides medium- and long-term special credit to support business entities in purchasing sorting equipment and building low-temperature storage and freshness-preservation facilities. Intelligent sorting can grade fruit by size, sugar content, and appearance, thereby stabilizing quality-grade standards. The cold-chain system reduces post-harvest decay and loss, extends the sales cycle, supports staggered sales, and alleviates the price pressure caused by concentrated market launch. At the same time, credit funds flow into deep-processing projects such as juice, candied fruit, dried fruit, and essential oil, shifting the industry from single fresh fruit sales to a parallel model of "fresh fruit + processed products." This increases added value, extends the industrial chain, and promotes the transformation of the midstream from primary collection and distribution to premium processing and value appreciation.

The application of sorting equipment can grade navel oranges according to indicators such as size and appearance, improve the consistency of product specifications, and create conditions for high-quality fruit to achieve better sales prices. Cold-chain and freshness-preservation facilities help reduce storage and transportation losses, appropriately extend the sales period, and allow business entities to avoid selling all their fruit during the harvest season, thereby giving them more room to schedule their sales pace.

3.3. Distribution and sales end: Empowering brand marketing and digital transformation

Traditional wholesale channels remain the core pathway for the circulation of Gannan navel oranges in the market. With the iterative upgrading of residents' consumption structure and the continued penetration of online retail formats, new sales models such as e-commerce and livestreaming sales have opened up incremental market space for industrial business entities. For small and medium-sized business entities, online channel development does not end with opening an online store. Subsequent operational team staffing, procurement of standardized packaging materials, brand marketing promotion, and cold-chain logistics delivery all require sustained capital investment. When working capital supply is insufficient, online businesses that have already been launched find it difficult to maintain stable operations, and there is a risk that channel construction will be abandoned halfway.

Inclusive finance can provide financial support around these operational needs, helping sales entities improve online store operations, livestreaming teams, and order delivery. Compared with simply adding online channels, the more critical issue is to enable sales, inventory, and shipping to connect with one another, thereby reducing operational difficulties caused by order fluctuations or poor capital turnover. Combining online channels with existing wholesale and retail channels can also increase sales options for business entities and reduce dependence on any single channel.

Brand building is a long-term and systematic project that requires sustained resource investment. Inclusive

finance can provide financial guarantees for eligible business entities to carry out product exhibitions and sales, regional brand market promotion, and customer relationship maintenance. However, the ultimate formation of brand reputation and market recognition still depends on stable and controllable fruit quality, standardized and unified use of geographical indications, and a sound and reliable after-sales service system. Only by advancing channel expansion in coordination with quality control, brand operation, and service guarantees can consumer awareness of and trust in the Gannan navel orange regional public brand be continuously strengthened, effectively converting market attention into sustainable sales revenue and brand premium.

3.4. Risk-sharing mechanism: Agricultural insurance as a supporting component of inclusive finance to hedge industrial risks

Navel orange cultivation has a long cycle and is highly dependent on natural conditions. Disasters and pests and diseases such as Huanglongbing (HLB), frost damage, floods, and droughts may cause large-scale yield reductions or even total crop failure, bringing losses to business entities, increasing the bad debt risk of financial institutions, and affecting continued credit investment. Locally, under the inclusive finance framework, a supporting mechanism of "credit + insurance" has been formed, combining policy-based agricultural insurance and agricultural product price insurance with credit products. Insurance covers the main risks in the planting cycle and, through claims compensation, stabilizes the income expectations of farmers, cooperatives, and enterprises. Its risk-mitigating effect also reduces banks' lending concerns and bad debt pressure, thereby enhancing financial institutions' willingness to support the industry. Credit support for development and insurance risk sharing complement each other, forming an industrial financial ecosystem featuring risk sharing and benefit sharing, and providing safeguards for the stable development of the Gannan navel orange industry.

4. Existing problems in inclusive finance support for the Gannan navel orange industry

4.1. Insufficient matching of financial products and mismatch between loan terms and the navel orange production cycle

The Gannan navel orange industry is characterized by large upfront investment and slow returns. Orchard establishment, young tree tending, pre-fruiting management, and subsequent renovation and renewal all require multi-year funding. Existing agriculture-related inclusive loans are mostly short-term and small in amount, and their term arrangements are inconsistent with the pace of cash flow recovery in orchards. Entities engaged in new planting, low-yield orchard transformation, or variety renewal often have not yet generated stable returns when their loans mature, resulting in obvious concentrated repayment pressure. There are relatively few dedicated products tailored to different growth stages and operational segments, and the flexibility in credit limits, terms, and repayment methods is insufficient, making it difficult to match the seasonal funding needs of fruit growers.

4.2. Persistent collateral and guarantee challenges and great difficulty in large-scale financing

As the Gannan navel orange industry advances toward large-scale and standardized development, capital needs have extended from daily working capital to medium- and long-term investments such as orchard renovation, cold-chain facilities, sorting and processing, and brand building. Smallholder farmers can use credit loans to cover part of their production funds, but the investment needs of large-scale entities are difficult to meet

through small-sum credit lines. The systems for confirming, evaluating, and disposing of assets such as orchard management rights, greenhouses, and warehouses remain underdeveloped, and eligible collateral is insufficient. Under banks' risk control requirements, guarantee conditions are stringent, and some entities with relatively sound operations still cannot obtain sufficient loans, impeding the allocation of financial resources to large-scale entities.

4.3. Insufficient agricultural insurance coverage and limited types of insurance

Navel orange operations simultaneously face pressures from natural disasters, pests and diseases, and price fluctuations. Current agricultural insurance focuses mainly on natural disaster protection, while coverage for price risks and distinctive diseases such as Huanglongbing (HLB) is insufficient. When market prices decline, planting insurance can hardly compensate for income losses; specialized insurance products are in short supply, and fruit growers also differ in their awareness of insurance participation. The scope of coverage, compensation standards, and coverage rate do not fully match the actual risks of the industry, and insurance has not yet fully played its role in stabilizing income and reducing fluctuations.

4.4. Barriers to the implementation of rural digital inclusive finance

Mobile payments, online credit, and digital insurance have gradually entered rural areas, providing convenience for financial services in mountainous regions. However, the Gannan navel orange production areas are scattered, and the digital application capabilities of business entities vary greatly. Some older fruit growers are unfamiliar with mobile banking, online loan applications, and digital insurance operations, and are prone to encountering obstacles in links such as identity authentication, document upload, and online application. Remote production areas have few physical branches, and the connection between online services and offline guidance is insufficient. Although digital technology can reduce costs, it does not necessarily automatically bring about equalization of services. Digital literacy and financial accessibility remain weak links in extending inclusive finance to the grassroots.

4.5. Inadequate multi-stakeholder coordination mechanism

As an emerging industry in Ganzhou City, the navel orange industry still has imperfect industrial development [9]. The Gannan navel orange industry involves multiple parties, including agricultural business entities, banks, insurance institutions, and relevant government departments. The information held by these parties could be complementary, but industrial operation data, credit data, and insurance data have not yet been fully interconnected. When granting credit, banks lack continuous and accurate information support regarding orchards' actual planting area, yield, sales revenue, and operational stability, making it difficult to conduct precise credit evaluations. Information asymmetry is obvious, and banks often choose more cautious credit-granting methods, which in turn raises financing thresholds. There is also room to further strengthen the connection among government agriculture-related policies, bank credit products, and insurance protection. Therefore, the difficulties faced by inclusive finance in the Gannan navel orange industry cannot simply be attributed to insufficient capital supply. Rather, they result from the combined effects of multiple links, including product supply, risk protection, digital services, and information sharing.

5. Optimization paths for inclusive finance to empower the high-quality development of the Gannan navel orange industry

5.1. Innovating specialized inclusive financial products tailored to the navel orange industry

Local banks in Ganzhou should be encouraged to develop special credit products for Gannan navel oranges, with medium- and long-term loan terms of 2–5 years set according to the growth cycle of fruit trees. Pledge financing using orchard management rights and future income rights of navel oranges should also be promoted to broaden the scope of collateral and meet the large-scale financing needs of scaled business entities.

5.2. Improving the risk protection system with credit–insurance linkage

Expand the coverage of policy-based insurance for navel oranges, and add special insurance for Huanglongbing (HLB) and fresh fruit price insurance. The government should provide certain premium subsidies to reduce the insurance costs of business entities and diversify the dual risks of natural disasters and market price fluctuations.

5.3. Building an industry information sharing platform to address information asymmetry

Local agriculture and rural affairs bureaus, in collaboration with financial institutions, should establish a Gannan navel orange business entity information platform that integrates information on orchard planting scale, fruit yield, and business credit, thereby helping financial institutions make precise credit decisions, reducing risk control costs, and improving credit-granting accuracy.

5.4. Promoting the expansion of digital inclusive finance to the grassroots and conducting financial literacy education

Continue to extend financial service stations downward to townships and villages, and rely on agricultural assistance cash withdrawal service points to expand basic financial functions, thereby filling the gap in physical outlets in remote production areas. Financial institutions and grassroots forces should be organized to go into villages and households and provide digital finance training for fruit growers in mountainous areas, especially middle-aged and older groups. The training should cover practical steps such as mobile banking operations, online loan applications, electronic policy inquiries, and online submission of claim materials, and should adopt a combination of centralized instruction and one-on-one tutoring in fields and orchards. Simplify the requirements for handling agriculture-related inclusive finance business, and promote online and one-time processing of identity verification, credit authorization, business data retrieval, and other steps. Where platform data can be used for cross-verification, duplicate submission of materials should no longer be required. For those unable to operate online, agency and door-to-door service channels should be retained to avoid creating new service exclusion.

5.5. Building a multi-stakeholder collaborative support system

The government should introduce interest subsidy policies to provide interest subsidies for inclusive loans directed to the navel orange industry, thereby reducing financing costs. It should also guide leading enterprises in the industry to take the lead in establishing an industry guarantee fund, providing guarantee support for upstream and downstream small and medium-sized business entities, and building a four-party collaborative model of "government + banks + insurance + leading enterprises."

6. Conclusion

As the core characteristic agricultural industry in Ganzhou City, the high-quality development of the Gannan navel orange industry cannot be achieved without the sustained empowerment of inclusive finance. Inclusive finance can help upgrade the industry from the production end, the processing and circulation end, the sales end, and the risk protection level. At present, problems still remain, such as insufficient product adaptability, weak risk protection, and information asymmetry. In the future, it is necessary to continuously unleash the effectiveness of inclusive finance through measures such as innovating customized financial products, improving the bank-insurance linkage mechanism, and building an industry information sharing platform, so as to empower the high-quality development of the Gannan navel orange industry and support rural revitalization in Gannan.

Disclosure statement

The authors declare no conflict of interest.

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