

Exploration of Innovative Paths for Developing Agricultural Product Marketing Using Planting Games in the Digital Economy Era

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ABSTRACT

In the context of the digital economy, although online marketing has gradually become the primary model for agricultural product promotion in recent years, due to factors such as lagging infrastructure construction and an incomplete logistics system, the effectiveness of agricultural product online marketing has often been less than ideal. Consequently, improving online marketing strategies for agricultural products has become a key concern for local governments. Based on this, the paper examines the current status of agricultural products in the digital economy era and the development of agricultural product games, proposing a comprehensive upgrade of agricultural product marketing strategies by leveraging virtual games in the digital economy era.

KEYWORDS

Digital economy; Agricultural product marketing; Creative agriculture

1 Development Status of Agricultural Products in the Digital Economy Era

The new era is one defined by data, and the development of all industries, including agriculture, is being redefined by digital technologies. Digital agriculture is an important indicator of national agricultural modernization. In recent years, the Ministry of Agriculture and Rural Affairs has vigorously promoted the application of digital technologies in agriculture and rural areas, achieving significant results in the digitalization of the agricultural industry, narrowing the digital divide between urban and rural areas, and fostering the development of new industries and business models. Major initiatives such as breeding research and development plans, genetic improvement programs, and the cultivation of new varieties have been implemented. Furthermore, efforts have been made to promote the construction of the National Modern Seed Industry Park, establish a modern seed development fund, and encourage enterprises to engage in research and innovation, resulting in significant achievements in the development of the modern seed industry.

Since the reform and opening-up policy, the central government has issued more than ten "No. 1 Documents" on rural work, each focusing on different aspects depending on the time. Over the years, keywords such as "precision agriculture" and "smart agriculture" have been repeatedly mentioned. In 2012, the No. 1 Document proposed, for the first time, the comprehensive promotion of agricultural informatization; in 2015, the modernization of agriculture became the primary topic of the No. 1 Document; in 2018, smart agriculture and rural revitalization were closely integrated; and in 2024, the emphasis continued on rural revitalization, with big data and the Internet empowering digital rural areas and promoting the development of smart agriculture. These policy

plans reflect the nation's strong commitment to the development of smart agriculture in China, significantly advancing its rapid growth.

Currently, the primary products in the smart agriculture market include data platform services, agricultural drone services, autonomous agricultural machinery services, and intelligent agricultural planting and animal husbandry services. According to data from enterprise inspections, there are approximately 14,000 smart agriculture-related enterprises operating in China. The number of agricultural drones and related professionals has steadily increased due to support from both the government and the state. While foreign companies such as Trimble currently dominate the autonomous agricultural machinery sector, domestic companies like China Haida are gradually improving their operations and technological capabilities, suggesting that more domestic companies will emerge in the future.

1.1 Analysis of the Development Status of the Agricultural Product Industry

From a policy perspective, the State Council issued the "Opinions on Comprehensively Promoting Rural Revitalization and Accelerating the Modernization of Agriculture and Rural Areas" in January 2021. The document emphasizes that the "14th Five-Year Plan" period is the first five years of the journey to achieve the second centenary goal of building a modern socialist country. The document highlights the importance of rural revitalization as essential to the rejuvenation of the nation. The "Opinions" set out the goals for modern agricultural development from 2021 to 2025: in 2021, the plan for agricultural and rural modernization was initiated, with the policy framework for poverty alleviation smoothly transitioning to rural revitalization, the rural construction action fully launched, rural living conditions improved, key tasks in rural reform deepened, and rural society maintained harmonious stability. By 2025, agricultural and rural modernization is expected to make significant progress, with agricultural infrastructure reaching new heights and rural living facilities significantly improving, achieving greater equality in basic public services between urban and rural areas.

1.2 Analysis of Agricultural Product Market Demand

In recent years, China's poultry breeding industry has undergone significant changes. On one hand, the outbreak of African Swine Fever has led to a sharp decline in livestock populations, creating a pork supply gap and sustained high pork prices. On the other hand, as market demand has grown, the poultry breeding industry has expanded rapidly. Consequently, pig-raising enterprises have also faced increased personnel demands, especially those transitioning from pig farming to poultry breeding. The difficulty in meeting these personnel needs has led to challenges in production management, resulting in declining production levels across many new breeding companies due to the dual pressures of market demands and disease management. The conflict between management methods and animal health and welfare has become increasingly prominent.

In this context, the use of intelligent technologies to achieve smart breeding has become highly promising. By utilizing the Internet of Things (IoT) to monitor environmental data and track the growth metrics of each animal, timely disease prevention and intelligent feeding systems can be implemented. This not only helps poultry breeding enterprises achieve refined management but also promotes the evolution of the poultry ecosystem. The increasing demand for poultry breeding has also spurred demand in the vegetable cultivation industry. As living standards continue to rise, people are seeking to improve their quality of life, further driving demand for agricultural products.

In 2021, China's smart agriculture market was valued at approximately 68.5 billion yuan. According to forecasts, the market is expected to maintain medium-to-high-speed growth, with an

estimated compound annual growth rate of 10%. The smart agriculture market in China is projected to reach 75.4 billion yuan by 2022 and grow to 121.4 billion yuan by 2027.

2 Market Research

As the boundary between virtual and real life becomes increasingly blurred, innovations such as the integration of virtual QQ farms, which were highly popular a decade ago, with today's online-offline hybrid e-commerce farms, reflect humanity's enduring passion for farming. This enthusiasm has been further fueled by the rise in agricultural production costs and the heightened focus on food safety due to the pandemic, making these innovations, which extend from games to real-life farms, a source of excitement for many.

2.1 Current Status of the Agricultural Product Market

At present, the agricultural product market in China shows a basic balance between supply and demand, but structural contradictions remain prominent. On one hand, agricultural production levels and technological advancements have increased the output of agricultural products year by year, ensuring sufficient market supply. However, most farmers' net income from agriculture remains limited.

High agricultural production costs have had a detrimental impact on farmers' incomes, as the prices of essential inputs such as fertilizers, pesticides, and fuel have consistently risen in recent years, thereby increasing production costs and reducing farmers' net earnings. Furthermore, the low level of agricultural industrialization has restricted income growth, as the agricultural value chain remains relatively short, and the processing and value-added components of agricultural products are underdeveloped. This, coupled with the decentralized nature of farming operations and low labor productivity, has exacerbated the financial challenges faced by farmers. In addition to these internal industry inefficiencies, small farmers and individual investors struggle to compete with large agricultural enterprises and cooperatives, which have expanded their market share through economies of scale and brand recognition. The disparity in market power is further aggravated by information asymmetry and limited sales channels available to smaller players, making it difficult for them to compete effectively. Moreover, issues related to the asymmetry of information, as well as concerns over product quality and safety, continue to hinder the healthy development of the agricultural product market, further complicating efforts to improve the economic standing of smaller farmers and the overall industry.

On the other hand, due to consumption upgrades and changes in dietary structures, the demand for high-quality, organic, and green agricultural products is growing rapidly. According to the "2022 China Organic Agriculture Development Report," the organic agricultural production area in China reached 15 million acres in 2022, a 15% year-on-year increase, accounting for 0.8% of the country's agricultural land. By the end of 2022, there were 27,246 certified green food and organic agricultural product enterprises in China, with a total of 60,254 products, representing a year-on-year growth of 10% and 8.3%, respectively. In addition, 748 standardized production bases for green food raw materials were built, covering more than 168 million acres of land, benefiting nearly 20.3 million farming households. Furthermore, 102 organic agricultural product bases and 41 green food-organic agriculture integrated industrial parks were established. The number of specialty new agricultural products also increased rapidly, with 1,012 products registered nationwide in 2022, bringing the cumulative total to 3,234. The total number of production and operation entities included in the management list reached 2,971, with 9,083 in total. The main consumer groups of organic agricultural products in China are high-income individuals, accounting for 70%, followed by

middle-income individuals at 25%. From a market perspective, the organic vegetable market is on a path of rapid growth, with its market share continuing to rise and expected to maintain strong growth in the coming years.

2.2 Current Status of Farm Simulation Games Market

Farm simulation games allow players to simulate operating a farm, where they can plant crops, raise animals, and manage farm operations. As mobile internet and smartphone gaming have become more prevalent, people now have more fragmented time, and farm simulation games are becoming increasingly popular, serving as a form of leisure and entertainment.

TalkingData tracked the monthly active users (MAU) of several popular farm simulation game apps, including Moore Manor, Jiangnan Hundred View Maps, Dream Town, and Life of Xiao Sen. According to the data, Moore Manor surpassed 40 million MAUs in June, far exceeding the figures for Life of Xiao Sen, which launched in late March.

The player demographic of farm simulation games is primarily composed of those born after 1990, accounting for 50% of the user base. Statistically, players aged 25-29 make up the largest proportion, at 35.07%, significantly higher than the mobile internet population's TGI score by 86 points (with the mobile internet population base being 100). Similarly, the TGI score for the 18-24 age group is also higher than that of the mobile internet population.

Most of these players belong to the so-called "Generation Z." As digital natives, this generation has a distinct sense of what they like and dislike, preferring to avoid constraints in both life and work. Consequently, they are easily drawn to farm games due to their free-form gameplay and engaging visuals. However, by contrast, the TGI score for players over 30 years old is significantly lower, likely because work and family responsibilities consume most of their time, leaving them with less energy to devote to gaming.

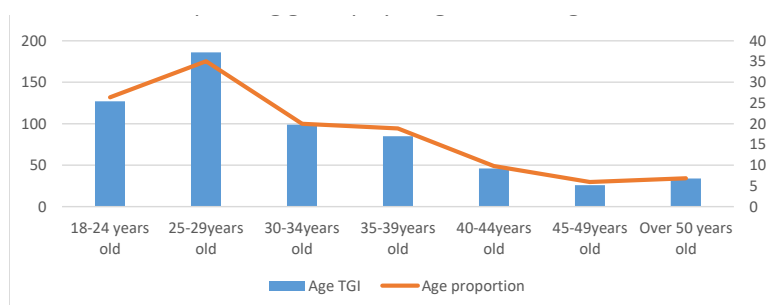


Fig.1 Farm operating game player age proportion and TGI

In addition, the data shows that female players outnumber male players in farm simulation games, with women accounting for nearly 70% of the total. This indicates that women tend to prefer this type of game. This preference is linked to the game's simplicity, ease of use, relaxing and enjoyable experience, and detailed, realistic graphics. As a result, farm simulation games, which are more casual and slow-paced, are more likely to attract female players.

In terms of application preferences, aside from mobile tools and communication/social apps, farm simulation game players mainly use mobile video and online shopping applications. Additionally, TGI index data shows that they have a stronger preference for lifestyle services, express delivery, and food service applications. This indirectly reflects that these players place greater emphasis on quality of life and are more willing to spend money and effort to improve their living standards.

The respondents of this survey included students, corporate white-collar workers, civil servants,

general company employees, freelancers, retirees, and self-employed individuals. The survey results indicate that consumers who are willing to engage in remote online farming are mainly freelancers, general company employees, self-employed individuals, and retirees, who typically have free time, energy, and stable incomes. Given the range of occupations covered in this survey, the data holds a certain level of reference value.

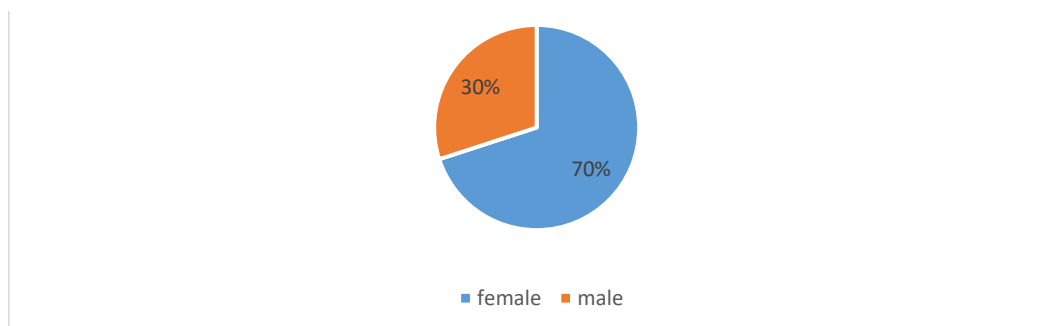


Fig.2 Farm operating game player gender proportion

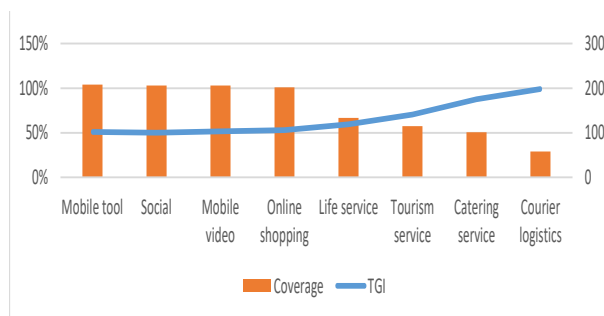


Fig.3 Farm operation game player mobile application preference

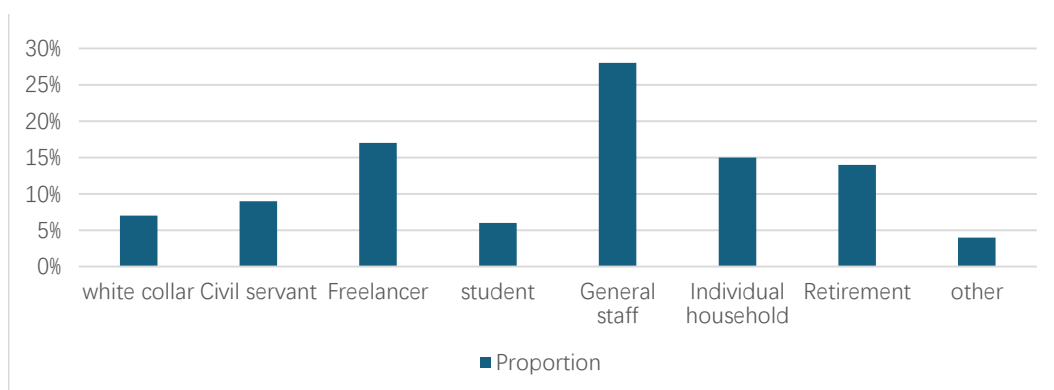


Fig.4 Different professional people are willing to remotely plant proportion online

The virtual gaming market and the physical farm market can both be further segmented into high-end, mid-range, and low-end markets based on consumption levels, according to the preliminary market research analysis. Our high-end market is aimed at the high-income group aged 25-40, the mid-range market targets the middle-aged and elderly group aged 41 and above, while the low-end market consists of college students aged 18-24. Based on the demographic structure of the respondents, 65% of consumers willing to spend money on purchasing vegetable, fruit, or fish seedlings are between the ages of 18 and 40, indicating that potential consumers are relatively

young and align with our target market positioning.

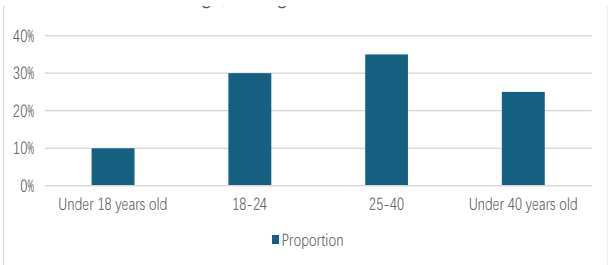


Fig.5 is willing to buy vegetable seedlings, fruit seedlings or fish fry consumers' age structure

According to the survey results, more than half of the respondents are concerned about the quality of vegetables, with 97 people being somewhat worried and 30 people being very worried, while only 25 people expressed confidence in the quality of vegetables.

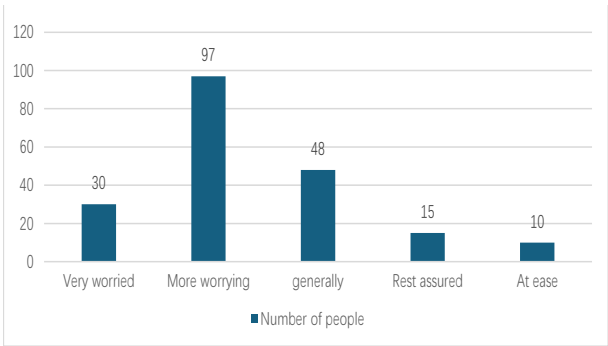


Fig.6 Consumers' awareness of vegetable safety

The survey revealed that most consumers believe that vegetable contamination primarily occurs during the cultivation process. This reflects the strong demand for green and organic vegetables and highlights the business opportunities associated with these products. Additionally, it serves as a reminder to agricultural producers to ensure the quality of vegetables by avoiding the use of chemical fertilizers and pesticides.

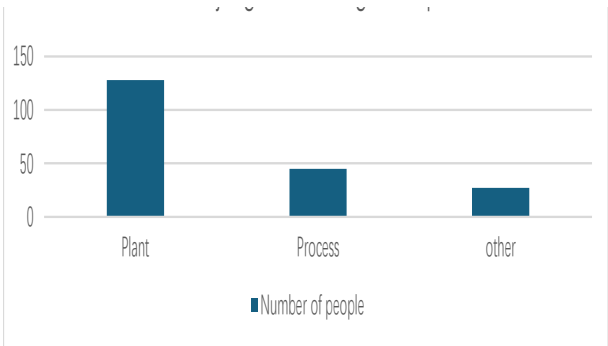


Fig.7 Consumer's judgment on vegetable pollution

In the process of product positioning, it is essential to address consumers' service requirements and resolve the key concerns mentioned in the survey. These include management issues (25%), transportation convenience (35%), pest control (5%), hardware facilities (15%), and land rental costs (20%). As long as our company improves its products and effectively addresses consumers' actual concerns, product positioning will become easier and more economically beneficial.

3 Market Environment Analysis

Against the backdrop of the rural revitalization strategy, agricultural supply-side structural reforms, and industrial development structure optimization, the development of modern agricultural industrial parks has become one of the important pathways that align with the needs of productivity growth. These modern agricultural industrial parks increase farmers' income and drive regional economic and industrial development, thereby further advancing modern agriculture.

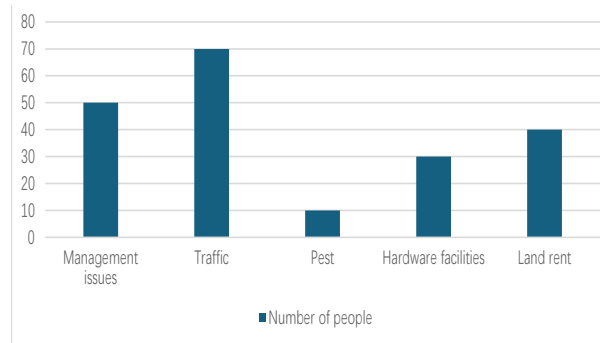


Fig.8 Consumer relationship issues

This paper analyzes the marketing environment in the digital economy era from a PEST (Political, Economic, Social, and Technological) perspective.

Table 1 Pest analysis

P (Political Environment Analysis)	E (Economic Environment Analysis)
(1) Related policies of various national departments encourage the development of the three farmers.	(1) With the development of the economy, the proportion of people's consumption expenditure for organic foods is increasing.
(2) The country pays more attention to the digital economy, and the digital economy is an important issue in my country's economic strategy.	(2) The development of the Internet economic model is huge.
(3) The combination of the country's implementation of the digital economy and the real economy provides a good consumer basic population for the agricultural product industry.	(3) The output value of organic agricultural products remains a high growth trend.
	(4) The national income continues to grow, and the concept of consumption of younger parents is transferred.
S (Social Environment Analysis)	T (Technical Environment Analysis)
(1) More and more people pay attention to health, and in terms of food selection, it is biased towards organic food	(1) The scale of network population users continues to expand, and the development of e-commerce technology has matured to provide good platforms for the Internet model
(2) Simulation game physical Internet platform, the demand is strong, and the potential market is large	(2) Inadequate sales channels for organic food, the industrial scale has not been implemented, and domestic retail channels are in a small and scattered situation.
(3) At present, the consumer channels for agricultural products are still at a small level, and there is still much room for improvement compared with some industrial emerging markets.	(3) As the world's larger agricultural production and exporter, China has advanced planting technology in the world, and market demand expansion will have a lot of room for growth
(4) Organic agriculture has become more and more developed as the trend of mainstream agricultural economic systems in society	

4 Innovative Approaches(1) Combining Virtual Games with Physical Farming (Agriculture + Games)

Farming World is a physical farming game where players can grow and nurture products within the app, such as purchasing seasonal vegetable seeds, planting them in virtual fields, and watering and fertilizing them regularly. Players can monitor the real-time progress of their crops through the app, and once the vegetables are fully grown, they can claim the physical product. Players have three options: they can have the vegetables shipped to them, exchange them for equivalent items in the app (such as new seasonal seeds or fertilizer), or allow the operator to sell the product and earn game currency. When players choose virtual products, the physical vegetables are sold in the official store. By merging virtual and physical experiences, players can remotely grow organic vegetables with just a few clicks, enjoying both the fun of the game and the reward of healthy, organic produce.

(2) Connecting Smart Agriculture with GamingThe physical farm in *Farming World* is a smart greenhouse that utilizes Internet of Things (IoT) technology. Sensors in the greenhouse monitor environmental factors such as soil moisture, temperature, light intensity, and air quality in real time. The data is analyzed and provided to the farm manager for appropriate action, while filtered information and suggestions are given to players, such as when to fertilize or water their crops to avoid reduced yields. One key application of IoT technology in *Farming World* is the smart irrigation system, which greatly enhances the player experience. Players do not need to water crops manually; the system gathers sensor data and alerts players when watering is necessary. When the player clicks the water button in the app, the connected land is automatically irrigated. The introduction of IoT technology not only enhances the player's experience and the game's interactivity but also conserves water resources and ensures timely irrigation and fertilization, improving overall crop yields.

(3) Special Assistance for Farmers*Farming World* features a dedicated section for assisting farmers, particularly those in impoverished areas, by helping them sell surplus agricultural products. Detailed descriptions of the planting locations and live broadcasts featuring farmers are provided. Additionally, the platform regularly invites local farmers to participate in live streams, where they share planting tips, life stories, and demonstrate cooking methods for their produce. *Farming World* has also launched an "On-Site Visit" program. Each month, the platform randomly selects a lucky player involved in growing the same agricultural product, offering them the chance to experience the difficulties faced by farmers and taste high-quality produce at lower prices. These activities are shared on major social media platforms to increase publicity. Through ongoing exploration and practice, *Farming World* continues to innovate and implement new models and pathways for assisting farmers. We believe that every small effort can contribute to a collective force capable of changing destinies.

5 Conclusion

Driven by the digital economy, agricultural product marketing is undergoing a revolutionary transformation, and traditional marketing models can no longer fully meet modern market demands. This study explores innovative approaches by combining smart agriculture with virtual gaming, proposing a new agricultural marketing strategy. By leveraging the interactivity and engagement of virtual games, this approach not only enhances consumer involvement but also successfully integrates virtual online experiences with actual production, creating new channels and models for agricultural product marketing. Through the application of smart agricultural technologies such as IoT and intelligent irrigation systems, this study demonstrates how digital tools

can improve production efficiency and marketing effectiveness for agricultural products. Additionally, the combination of special assistance programs for farmers and virtual games provides new solutions for the sale of agricultural products from impoverished regions, facilitating direct connections between farmers and consumers. This innovation not only boosts the market competitiveness of agricultural products but also supports the implementation of rural revitalization strategies, contributing to rural economic development. Looking ahead, as smart agriculture and the digital economy continue to evolve, the application of virtual games in agricultural product marketing holds even greater potential. With ongoing exploration and practice, the online marketing of agricultural products will further improve, aiding the transformation and upgrading of the agricultural industry and enhancing China's position in the global agricultural market.

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