

Analysis of the Impact of Green Finance on Green Agriculture: A Case Study of Ant Forest

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Abstract: Due to the strong externalities of environment and climate, traditional agriculture is often accompanied by financing difficulties and high pollution problems. However, with the support of green finance, Internet technology and scientific and technological innovation, the problem of agricultural financing difficulties can be effectively solved to improve the environment, reduce carbon emissions, increase farmers' income, and promote the transformation of traditional agriculture to green agriculture to a certain extent. In this paper, the impact of green finance in green agriculture development was analysed with the Ant Forest as the entry point, and then some practical suggestions were provided.

Keywords: Green Finance, Green Agriculture, Ant Forest

1. Introduction

Green finance, also known as environmental finance, sustainability finance or carbon finance, is based on the coordinated development of financial activities and environmental protection and ecological environment, showing commonality with green agriculture, which aims to combine agricultural production with environmental protection and realize coordinated development. Therefore, green finance can boost the development of green agriculture to some extent. Although many ways of green finance, such as green bonds, green credit, etc., have been developed to support the development of green agriculture and achieved quite a few practice cases, there are still many obstacles to be solved.

2. Overview on the Development of Green Agriculture

2.1. Overview on Ant Forest

Ant Forest is a public welfare project oriented to driving the public to participate in carbon emission reduction activities, and individual's low-carbon behaviors are converted into different values of "green energy" in Ant Forest. After accumulating enough green energy, one can apply through the mobile phone to plant a real tree in an area in urgent need of ecological restoration, or "adopt" conservation rights in an area in urgent need of biodiversity protection.

Ant Forest is mainly operated in the mode of establishing a "carbon account" for everyone, and encouraging users to collect green energy for the greening of the earth through the "game + public welfare" pattern. Users of Ant Forest can collect enough green energy through the following three main ways. The first is to obtain green energy through green travel and low-carbon consumption, such as payment of living facilities, online ticketing, shared bicycle, travel by bus and underground, which instill the public with the awareness of low-carbon life; the second is through offline payment, e-invoice, green takeaway services and other paper and plastic reduction behaviors, which helps to save resources and realize low-carbon environmental protection; the third is to obtain green energy by helping friends watering his or her tree, stealing friends' energy and other interactive ways, which attract a large number of young users and increases customer stickiness.

2.2. The Development Status of Ant Forest

Ant Forest under the mode of "Internet + Finance" is in line with the characteristics of innovation-based green finance, which realizes environmental protection through the most effective combination of financial instruments. Besides, the forestry industry it creates agrees with green agriculture in terms of

its characteristics of valuing the co-ordination and combination of agricultural production and environmental protection and increasing farmers' incomes. Therefore, Ant Forest is a typical case of developing green agriculture with the help of green finance.

Until August 2021, there had been 613 million users (person-times) of Ant Forest, and over 20 million tons of green energy had been generated in five years. Ant Forest has joined hands with eight public welfare partners, including the China Green Foundation and the China Environmental Protection Foundation, to plant a total of 326 million trees in 11 provinces, including Inner Mongolia, Gansu, Qinghai and Ningxia, with a total planting area of more than 2,647 square kilometers; besides, it had provided green employment opportunities such as planting, maintenance and patrolling for 2.38 million people and generated additional labor income of 350 million CNY for the local residents. These data reflect that the concept of green and low-carbon life advocated by Ant Forest has gradually penetrated into people's minds, and forestry developed by it has realized a certain scale, and effectively lead the development of the local economy, showing positive and reference significance for the development of green agriculture.

According to the data in Table 1 below, assuming that the internal and external factors affecting Ant Forest from June 2020 to August 2021 are basically the same, and that the number of users, the number of actual plantings, and the planted area of Ant Forest are growing with time on average, then the data of Ant Forest by June 2020 was revised to that by August 2020, and the number of users would be 559 million (a YoY growth of 11.8%); the number of actual plantings would grow at the rate of 78.69% to reach 559 million; the planting area would be about 1,944 square kilometers with the YoY growth of 76.71%; then, by August 2021, the number of users, the number of actual plantings, and the planting area increased by 9.66% year-on-year, 49.54% year-on-year, and 36.16% year-on-year, respectively. From the above data, it can be seen that Ant Forest still maintained a rapid growing state from 2019 to 2021; however, the year-on-year growth rate was slowing down, especially those of the number of actual plantings and planting area, which decreased by 29.15% and 40.55% respectively.

Table 1: Data of Ant Forest in 2019-2021

Time	Number of Users (100 Million)	Number of actual Plantings (100 Million Trees)	Planting Area (km ²)
August 2019	5	1.22	1,100
June 2020	5.5	2	1,827
August 2021	6.13	3.26	2,647

(Note 1) Data Source: By the 3rd Anniversary of Ant Forest, its 500 Million Users Realized the Accumulated Carbon Emission Reduction of 7.92 Million Tons. TechWeb. 2019-08-27

(Note 2) Data Source: Alipay: Ant Forest Planted More than 200 Million Trees at the Planting Area Equivalent to 2.5 Singapore. Sina VR. 2020-06-05

(Note 3) Data Source: Forest No. 277 Is Questioned for No Tree Planted, and Ant Forest Response "the Planting Completed in 2019". Guangming.com.cn. 2021-09-14

3. The Positive Impact of Green Finance on the Development of Green Agriculture

The positive impact of green finance on the development of green agriculture is analyzed below with the example of Ant Forest, and is mainly reflected in the following three aspects.

First, Ant Forest's "Internet + Finance" model provides a certain ideological basis for the development of green agriculture. The game pattern of Ant Forest, which involves low-carbon travel and friend interaction to collect green energy for tree planting, converts the original public welfare mode of donating saplings and funds into the low-cost indirect mode of Internet + green finance. This interesting tree planting mode can fully attract young people, mobilize users' enthusiasm for public welfare, and greatly expand the users of Ant Forest. By 2021, it had 613 million users, reflecting that the concept of green and low-carbon life advocated by Ant Forest has been slowly popularized, and more and more people are aware of the importance of protecting the environment. This change in thinking has laid a good ideological foundation for the transformation of traditional agriculture to green agriculture, allowing people to realize that the development of agriculture should be transformed from traditional agriculture, which only pays attention to quantity, to green agriculture, which pays equal attention to quantity and quality and focuses on the synergistic development with the environment.

Secondly, the "carbon account" of Ant Forest provides certain economic support for the development of green forestry. It lowers the threshold of access to green finance, and provides a new way for ordinary

users to participate in green finance. Unlike the previously dominating operation mode in China, which take green bonds and green credits as the major forms and take enterprises as the target customers, Ant Forest uses Internet technology to closely link green finance with every user, by bringing together the power of substantial users to help the development of green finance, so that more funds can be absorbed from the society to provide more economic support for the green development of forestry, and more people can join in the development of forestry. It effectively solves the financing difficulty for agriculture, and the green forestry has been developed rapidly. This positive effect can be seen from the data. At the end of May 2018, the tree planting area of Ant Forest exceeded 507 square kilometers at the end of May 2018 and 2,647 square kilometers by August 2021, with the trees planted increased from more than 42 million to more than 326 million. These changes have also prompted an increase in the area of green planting in some desert areas, which plays a role in preventing wind and sand and reducing soil erosion. Besides, these plants, such as *hedysarum scoparium*, sea buckthorn, *hedysarum scoparium*, and *salix mongolica*, can also bring certain economic value. Ant Forest really makes green agriculture to coordinate forestry development and environmental protection for forestry development, and increases the income of the growers.

Third, Ant Forest's innovative public-welfare forest mode provides new ideas for green agriculture development. The mode is to plant trees in those desert and Gobi areas by gathering the power of the society. On June 5, 2019, the public-welfare forest plate was just launched for a month, and under the propaganda of schools, media and public welfare organizations, it had enrolled the public in the activity and planted tens of thousands of mongolian scotch pines. The model utilizes the Internet to fully play the subjective initiative of the masses, thus more effectively promote the construction of this innovative public-welfare forest. The success of this mode provides a favorable reference for the future development of green agriculture, and opens up new ideas. In the future, green agriculture can be effectively developed with green finance as the support and the Internet and technological innovation as a means under innovative operation modes.

4. Obstacles Hindering Green Finance from Promoting the Development of Green Agriculture

The obstacles hindering green finance from promoting the development of green agriculture are analyzed with Ant Forest as the case and are mainly reflected in the following six aspects.

First, green finance is accompanied with the inconsistency connotation standards between domestic and foreign green bonds. Compared with the international requirement that at least 95% of the proceeds of green bonds must be linked to green projects, the domestic green standard is more relaxed and requires only 50%-70% of the proceeds to be used for repayment of bank loans or general capital investment related to green projects; green bonds are classified according to the different uses of funds and methods of recourse in the international context, while in the domestic context they are classified based on differences in the regulatory agencies, with reference to the classification of ordinary bonds; the investment of funds raised at home and abroad is different, as international investors generally accept that green bonds should link at least 95% of the funds raised to specific green assets or projects, while in China's market, the threshold requirement is less strict, and the National Development and Reform Commission (NDRC) and Shanghai and Shenzhen Stock Exchanges require the ratios of 80% and 70% or more, respectively; the disclosure of information on green bonds is insufficient in China, as CBI data shows that the information on Chinese green bonds totaling 5.6 billion CNY (822 million USD) in 2019 was insufficiently disclosed on the use of funds raised. The inconsistency of the connotation standards of green bonds at home and abroad is unfavorable to the establishment of China's green bond market, and the differentiation of the standards will lead to higher transaction costs in evaluation and compliance, and to a certain extent will reduce the attractiveness of China's green bonds in the global market, which is not conducive to the further development of China's green agriculture with foreign capital.

Secondly, green agriculture financing entities lack an effective credit system. Ant Forest, relying on Ant Financial Service, is successful in financing. On October 23, 2018, the National Greening Committee Office, China Green Foundation and Ant Financial Service Group officially signed the "Internet + Universal Compulsory Tree Planting" strategic cooperation agreement, and Alipay Ant Forest tree planting mode was officially included in the national compulsory tree planting system.^[1] As a result, Ant Forest can better raise private greening funds. In addition, Ant Forest can raise more funds by using the economic volume of Ant Financial Service to carry public fund-raising activities and international cooperation and assistance. But most of the other green agricultural financing subjects in China are ordinary farmers, family farms and small and micro enterprises without fully established credit systems, which makes it difficult for them to get credit and raise funds from financial institutions. The incomplete

credit files of these new agricultural business subjects and the serious information asymmetry between them and the financial institutions have led to the fact that the banking and financial institutions are unable to fully understand the real qualifications and development prospects of these business subjects in their credit ratings. It is very easy to determine that the credit business of these subjects is characterized by high risk, low profit and high supervision difficulty, and the institutions possibly cannot recover the loan funds after the loan is granted, so they dare not or are not willing to grant loans to these subjects.

Third, green agriculture lacks an effective risk-sharing mechanism. Ant Forest is included in the national compulsory tree planting system, so it transfers part of the risk to the state. At the same time, relying on the economic volume of Ant Financial Service, it can also better cope with risks. However, other green agricultural projects with a profit-making purpose often face higher external environmental risks and price fluctuation risks, coupled with the investment risks of green agricultural technology development, so it is necessary to establish a more complete and effective risk-sharing mechanism, especially in industries such as animal husbandry and mariculture. Although China has been steadily advancing its green financial policy and has made great progress in bonds and other areas, it is not optimistic for China's agricultural insurance to share risks of green agriculture. Because agricultural insurance is often accompanied by higher risks, lower coverage, higher payout rate and higher yield than other insurance types, many commercial insurance companies are either unwilling to launch agricultural insurance, or only launched too few types of insurance to meet the individual needs of different agricultural business entities.

Fourth, there is no scaled market mechanism. Most of the trees planted in Ant Forest are planted in the arid desert areas, more to play a role of managing wind and sand, protecting the environment and preventing soil erosion. Although the plants like *hedysarum scoparium* and sea buckthorn generate economic benefits and increase local farmers' income, Ant Forest is more for public welfare purposes. Differently, the low-carbon agricultural products yield by green agriculture are most for profit-making purpose, and would involve the problem of green product pricing. However, due to the late start of China's green agriculture, no sound certification and pricing system has been formed for China's green low-carbon agricultural products, and there is no perfect market system for green agriculture. Firstly, in terms of the certification mechanism, due to the lack of perfect identification and inspection systems for agricultural products, the quality of green agricultural products cannot be measured scientifically and effectively, resulting in the uneven quality of green agricultural products in the market, the overpricing of some green agricultural products, and a large number of counterfeit and shoddy green agricultural products, which seriously affect the healthy development of green agriculture; secondly, in terms of the promotion mechanism, green agricultural planting technology has not been sufficiently promoted, but promoted simply through the process of the relevant business departments without combining the actual situation of different regions in a differentiated way, resulting in improper promotion system for green agriculture; finally, in terms of the circulation mechanism, China's rural areas lack of effective information transmission channels and specialized trading platforms for green agricultural products, which has led to the failure in effective market circulation of green agricultural products and has seriously compromised the enthusiasm of the entities of green agriculture .

Fifth, the scope of green agriculture is not clearly defined. The forestry of Ant Forest coordinates and combines agricultural production and environmental protection, which is undoubtedly a kind of green agriculture. However, some areas of green agriculture are relatively fuzzy to determine. First, there are inconsistencies in the existing green financial standards regarding the content of the agricultural part. For example, this problem exists between the *Notice* issued by the People's Bank of China (PBOC) and the *System* issued by the China Banking and Insurance Regulatory Commission (CBIRC). The category "8.6 Eco-products Trade" in the CBIRC's *System* includes "Bulk Green Commodities Trade" (8.6.1) and "Other Green Products Trade" (8.6.2) for agriculture, forestry, animal husbandry and fishery products, and the *System* also stipulates the green standards to be met. The *Notice* issued by the PBOC does not include the above categories in the statistical scope of green loans, so some green agricultural fields may miss development opportunities if they do not have access to green loans^[2]. Second, it is still controversial whether some agricultural fields should be included in the scope of green finance. An example is the bamboo industry, which is one of the pillar industries in Anji County, Huzhou City, Zhejiang Province; originally, the bamboo that can be cut within its growth cycle is produced and processed into bamboo products, which are then traded for profits; however, the local regulatory authorities fear that this mode will lead to the destruction of the original bamboo forest resources, and did not conclude the bamboo industry in the green credit standards.

Sixth, there is a lack of professional green talents and a sound training mechanism. Now, the development of green financial sector is more lack of green financial technology professionals. Green

financial technology is a combination of green finance and financial technology, and requires relevant composite professionals to have a deep understanding of the green financial business and to skillfully master the cloud computing, blockchain and other financial technology. However, financial institutions are more lack of relevant green financial technology talents in their practice. Only by vigorously cultivating green financial science and technology talents can we promote the development of green finance, and better support green agriculture. Besides, there is a talent deficiency in the field of green agriculture. Chinese residents or individual businessmen engaged in agriculture are often at a higher age level, lack scientific and technological knowledge about green agriculture, and cannot effectively grasp the green agricultural farming techniques, resulting in the failure in the implementation of some green agriculture, and the shortage of composite talents in the field of green agriculture for the research of new technologies as well as the lack of innovative enterprises to explore different green agricultural marketing models.

5. Suggestions for Promoting the Development of Green Agriculture

5.1. Use foreign capital to deal with the inconsistencies between internal and external standards for green bonds

China has made continuous efforts to regulate the development of the green bond market. The basic regulations for green bond supervision in China include the *Guidelines for the Issuance of Green Bonds* and the *Catalogue of Projects Supported by Green Bonds (2021 Edition)*. Besides, different guidelines and rules have been issued for different types of green bonds, including the *Announcement of Matters Relating to the Issuance of Green Financial Bonds in the Inter-bank Bond Market* issued by the People's Bank of China, the *Business Guidelines on Green Debt Financing Tools for Non-Financial Enterprises* formulated by the National Association of Financial Market Institutional Investors. At the same time, we can deal with the inconsistencies with "external forces". We can make full use of the global resources, global network and local experience of foreign banks operating in China, and develop their "bridge" role to help China's green bonds align with international standards in terms of aspects including risk management in the ESG area of green bonds, assistance in offshore bond issuance, and scientific research and innovation. For example, as one of the early signatories of the Equator Principles, HSBC Group has established its sustainable development policy to help define its internal business risk tolerance level and encourage its clients to meet good international standards of behavior.

5.2. Establish a third-party credit platform and an integrated financial services platform

Government departments can integrate the credit information of financial institutions, enterprises and individuals to establish an accurate and specific third-party information sharing platform, which will improve the credit system. Besides, they can take incentives for trustworthiness and punishment mechanisms for breach of trust to regulate the market and ensure that financial institutions, enterprises and individuals provide accurate and comprehensive information. These will alleviate the information asymmetry between new agricultural management subjects and financial institutions. At the same time, government agencies can make use of big data, artificial intelligence, cloud computing and other technologies to create more green and low-carbon comprehensive financial services platforms like "Lvdaotong", "Lvrongtong" and "Lvxitong" of Huzhou City. Such platforms can better integrate the environmental climate data of various departments, converge more financial institutions and credit products, and thus help banks and other financial institutions and small and medium-sized green agricultural enterprises with efficient connections, which will shorten the financing process, improve the effectiveness of risk control, and provide a solid foundation for the government, financial institutions and green agricultural enterprises to establish win-win cooperation.

5.3. Increase the input and development of agrometeorological index insurances and green low-carbon technology insurances

Agrometeorological index insurances are a typical type of agricultural insurance to cope with the physical risk of climate change, and the level of compensation is determined according to whether the intensity of climate disasters reaches the trigger level. In terms of specific product design, agrometeorological index insurances present the characteristic of "tailored to local conditions". Customizing products according to local agricultural characteristics and differences in the main types of disasters can effectively alleviate the problem of strong climate externalities in agriculture. However, the

scale of China's agricultural insurance in 2020 amounted to 81.5 billion CNY, accounting for 6% of premium income of the national property insurance company, which was a relatively small investment. Besides, most of them are still in the pilot state and have not been popularized. Therefore, we should increase the investment in agrometeorological index insurance and encourage insurance companies to combine the actual situation of local agricultural production and natural disasters, set up more quantitative indicators of agrometeorological index insurance products, and launch more locally adapted agrometeorological index insurance products; at the same time, the insurance companies can develop and launch more insurance products related to green technology research and development funds, as well as those related to patent enforcement, patent infringement losses, and patent pledge, financing and repayment guarantees, which can share risks and protect intellectual property rights for green agricultural enterprises to research and develop green low-carbon technologies, thus alleviating the problem of high risks across the entire process from R&D and innovation of green low-carbon technologies to commercial promotion.

5.4. Improve the market system for green agricultural products and the scope of green financial support for green agriculture

The government needs to improve the market system of green agricultural products. First of all, it needs to establish an effective identification system and inspection system for green agricultural products, so as to eliminate the fake and shoddy green agricultural products, and secure the shopping process for buyers; on this basis, it can encourage the development of order-based agriculture, reduce stall rent, or reduce the cost by eliminating intermediate links from the manufacturers to the individual enterprises and then to customers. Besides, Internet and intelligent communication technologies can be used to open the promotion and sales channels; we-media propaganda can be applied to instill the idea of green development, so that more farmers will understand green agriculture, and access new technologies of green agriculture. Meanwhile, we should make full use of Taobao, Pinduoduo and other domestic e-commerce platforms, establish a new mode of living broadcast-based selling agencies, and open the "online + offline" sales channels, so as to increase the income for farmers engaged in green agriculture and strengthen their confidence in green agriculture. Moreover, the government should determine the exact scope of green financial support for green agriculture, so as to prevent some green agriculture from missing the green financial support and giving up the development of green agriculture due to a lack of funds.

5.5. Strengthen the training of green professionals

Regulators can introduce relevant policies to encourage financial institutions to develop green finance and achieve low-carbon transformation through financial technology, to make financial institutions and other relevant subjects strengthen the training of financial technology talents and establish relevant professional talent team, and to promote the integration between green finance and Internet, big data, cloud computing and other financial technologies. These financial technology advantages can be utilized to make up for the potential shortcomings of green finance. For example, Internet technology can improve the accessibility of information and circulation rate, put the original offline green financial business online, and bring more fair and open information disclosure technology, which alleviates the information asymmetry in the green financial industry^[3], thus indirectly helping to develop the main body of green agriculture with the access to financing and promoting the development of green agriculture.

6. Conclusions

In short, green finance can effectively promote the development of green agriculture, improve the environment, reduce carbon emissions, and improve the financial accessibility of green agricultural business subjects. In the future development of green agriculture, we should firstly determine the scope of green financial support for green agriculture, and improve the credit system so that green agricultural business entities can obtain credit. Secondly, we should improve the risk-sharing mechanism of green agriculture by promulgating some preferential policies and developing differentiated insurance products, and create a large-scale market mechanism for green agricultural products to improve the pricing of green agricultural products. Finally, we need to cultivate more green financial science and technology talents and specialized green agricultural talents.

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