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Original Paper

A Dialectical Analysis on Upgrading Underdeveloped Guangdong Agriculture with Digital Ecological Industry

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Abstract

The upgrading of underdeveloped Guangdong agriculture is analysed by Materialist dialectics. Agriculture should not be seen as a symbol of backwardness, but rather as an important ecological industry that can be upgraded with advanced digital science and technology. Cognitive innovation and environmental innovation are emphasized in attracting innovative talents and supporting digital ecological industry. The upgrading path of the digital ecological industry highlights top-level design and systematic planning. Overall, the document emphasizes the strategic value of agriculture and the potential for Guangdong to play a dominant role in the Regional Comprehensive Economic Partnership (RCEP) through digital ecological industry upgrading. Digitalization may enable Guangdong integrate agriculture, industry, and service industries to achieve ecological civilization.

Keywords

Guangdong, RCEP, agriculture digitization, digital ecological industry, industry upgrading

1. Introduction

Guangdong province located at the forefront of Chinese reform and opening up, is significantly ahead of other provinces in terms of industrial economy, however has an underdeveloped agriculture. For example, its agricultural exports reached 1.58 billion US dollars, ranking third in China 2022, with the scale of import and export of agricultural products ranking first (Xiao, 2023). The fact that Guangdong's agricultural exports excess imports displays that it's agricultural production cannot get the ends met. The contrast of imports and exports reveals that Guangdong agriculture is underdeveloped. For Guangdong to play a dominant role in RCEP (Regional Comprehensive Economic Partnership), which marks regional economic integration with the world's largest population, largest economic and trade scale, and greatest development potential, we should then learn from foreign successful experience of agricultural digitization, to strengthen ecological industry upgrading with the endogenous power of the domestic big cycle. The current researching requires effective methodology to improve its application. Materialist dialectics is the methodology proved truth during the reform and opening-up practice of our Communist Party of China (CPC) (Xi, 2019, pp. 9-11). This methodology is then applied here to enhance the analysis of upgrading politic measures for underdeveloped Guangdong agriculture, considering that the materialist dialectics of Marxism has been used effectively in analyzing innovation (Luo, 2016), and it was even praised highly by Russell in his masterpiece A Brief History of Western Philosophy.

Analyzing in the realm of innovation theory, the agricultural digitization belongs to scientific and technological innovation, which can provide the scientific and technological conditions that determine the level of agriculture productivity. Meanwhile, the tourism industry is found closely related to the construction of ecological civilization, and they influence and promote each other (Zhang, 2021, pp. 45-53). The industrial structure is gradually changing to ecology (Lin & Zhong, 2020, pp. 221-225). Materialist dialectics inspires us embrace the world basing on the provincial situation, and to develop ecological industry accordingly. The provincial situation of Guangdong displays, Guangdong has actively explored the digital economy, continuously committed to establishing and improving the digital Guangdong, constructing a "sound digital economy statistical monitoring system", and accelerating the coordinated development of the three industries of agriculture, industry, and service. To be specific, Guangdong has formulated the country's first market-oriented reform action plan for data elements, issued the country's first public data asset certificate, pioneered the implementation of the Chief Data Officer system, and introduced the country's first provincial public data management measures, effectively promoting the development of the digital economy (Gu, 2021, pp. 26-27), implemented as well, digital transformation of traditional industrial clusters, and put especial emphasis on providing digital products and services through Industrial Internet platforms (Editorial Department, 2021, pp. 79-84). Guangdong's rapid development makes ecological industry upgrading equip with digital conditions. We propose then to make the upgrading of underdeveloped Guangdong agriculture

by digital ecological industry, combining its historical accumulation, characteristic resources and geographical advantages etc. to implement the digital integration of the three industries.

2. Realize the Internationalization of Digital Ecological Industry Positioning

Materialist dialectics views everything an unity of two aspects, the first aspect poses decisive function namely the principle aspect or primary aspect, usually composed of elements relating to practice or matter. In contrast, the second aspect poses reactive function is the auxiliary aspect, usually composed of elements relating to theory or notion. Applying the methodology of Materialist dialectics, the internationalization in positioning Guangdong digital ecological industry could then be analyzed from the two aspects of practice and cognition respectively.

2.1 Cognition Innovation: Digitization Upgrades Agriculture Digital Ecological Industry

The agricultural industry in Guangdong has historical accumulation, characteristic resources and geographical advantages, however requires still to emphasize innovation-driven, applying digital science and technology to upgrade the digital ecological industry, so as to implement industrial integration guided by ecological values. Agriculture is inquired by ecological restoration by nature, and doesn't equal to backward industry. Advanced digital science and technology can create advanced agriculture. Historically speaking, China's backwardness is not because the agriculture is a backward industry, but because all industries of China including agriculture, especially high-tech industry, are backward. In the new era that rejuvenating the Chinese nation, we should re-examine the strategic value of agriculture, and then upgrade to the digital ecological industry with high technology, so as to jump from "getting rich" to "becoming strong". Whoever controls the grain will control everyone. A large part of the voice of the United States in the international arena comes from its pricing power of agricultural products, especially food products. It is actually an ecological civilization power that dominates global agriculture. Hence, the stereotype that agriculture means backwardness should be targeted and smashed. While agriculture merged with advanced digital science and technology, it would become an important ecological industry.

Conceptual innovation is an indispensable theoretical condition for practice innovation. The ecological industry is usually considered a kind of new and developing model of industrial sustainable development. The digital ecological industry by dialectical analysis has two aspects of meaning: in the essence aspect, it is the upgraded digital industry that integrates agriculture, industry, and service industries to reveal the goal of ecological civilization; and in the characteristic aspect, it adheres to the industrial upgrading with the guidance of ecological values, distinguishing from other industries. In order to make a clear concept, the digital ecological industry is defined here the digital integration industry of the agricultural, industrial and service sectors positioning ecological civilization. Timely upgrade to the digital ecological industry, we may enable Guangdong capture the opportunity of digitization to win the future. And this digital ecological industry positioning provides Guangdong an

international orientation leading us to find opportunities in RCEP, which is the free trade zone with the largest population, the largest economic and trade scale and the greatest development potential in the world (Li, n.d.). Clear position in RCEP can then help integrate the upstream and downstream supply chains and industrial chains of the three industries of agriculture, industry, and service industries, so as to form a comprehensive digital ecological industry upgrading the underdeveloped agriculture of Guangdong.

2.2 Environmental Innovation: Upgrade Ecologically Attracts Innovative Talents

Innovation is the first driving force to lead development, and innovative talent is accordingly the first resource. The talents don't go to the United States is because of being scared away by "political correctness" or feeling can't stand "racism" (Xing, 2021). This indicates at least that the social environment, political environment and cultural environment are not the main factors for attracting talents. What the talents mind more is ecology and catering. The social, political, cultural and even economic environment in the United States of America is insufficient, however the better ecological and catering environment play dominant role attracting innovative talents from all over the world, maintaining its innovation advantage that cannot be ignored. This inspires us to create Guangdong attractive ecological environment and catering environment, to gather innovative talents and accumulate innovative advantages. As to attract innovative talents for digital upgrading, efforts should be made to highlight the advantages of ecology, tourism and catering integrate into the upgrading of ecological industry. In practice, Guangdong has historical accumulation of excellent tourism cities, garden cities, health cities, environmental protection model cities, together with historical and cultural cities, should be fully utilized to integrate industries ecologically. As a hub connecting the Maritime Silk Road and the Land Silk Road Economic Belt, Guangdong has also the regional advantages to integrate international resources and markets, integrate smart agriculture and upgrade to become the RCEP ecological civilization industrial hub.

As previously mentioned, the practice is usually the principle aspect, playing decisive role, so we can say that to upgrade ecologically is the principle aspect that dominates the upgrading of underdeveloped Guangdong agriculture. And we can say that the cognition innovation such as to overcome the stereotype that agriculture means backwardness is the secondary aspect. For the digital ecological industry upgrading, there are for sure other conditions to be prepared, whereas the practice of upgrading ecologically together with the environment of emphasizing talents value composes the major factors dominating the digital ecological industry upgrading of underdeveloped Guangdong agriculture.

3. Upgrading Path of the Digital Ecological Industry

The dialectical analysis plays an efficient role in manifesting the internal contradictions of the digital ecological industry upgrading. Besides, to cooperate with the internal contradictions, absorbing international experiences of ecological industry upgrading is prerequisite as well for us to embrace the world. The federal government, state governments, and agricultural enterprises in the United States of America have clear division of labor and cooperation in various aspects of agricultural digital upgrading (U.S. DEPARTMENT OF AGRICULTURE [TP/OL], 2023). This reveals the systematic importance of top-level design, which should be used for reference in the digital ecological industry upgrading of underdeveloped Guangdong agriculture.

3.1 Systematize the Top-level Design of Digital Ecological Industry

The top-level design can give full play to the institutional advantages of concentrating on major events, paying attention to the internal relationship between agriculture, rural areas and farmers etc. Only by proceeding from the actual situation of agricultural and rural farmers and combining the specific needs with the systematic design of agricultural digitization, can we significantly optimize the ecological environment, economic quality, especially the quality of diet concerning health, so as to enforce a strong attraction for innovative talents and resources.

3.1.1 Overall Construction of Digital Ecological Industry Upgrading Environment

Education plays an irreplaceable active role in industrial integration, such as deciding whether farmers can upgrade digital ecological industry in combination with the agricultural digitization. And to build a cultural environment, should provide human resources required for the upgrading of the digital ecological industry, create an upgrading atmosphere, and establish a systematic value orientation, we should then take compulsory education as the main channel of digital interest cultivation, leading the promotion of various benefits and operating points of agricultural digital ecological industry upgrading, and supplemented by ecological implement labor education. Besides, to build an agricultural digital science and technology environment and provide employees with necessary knowledge and skills required for the upgrading of the digital ecological industry, it maybe of more digital value and applicability to make all the content of education convenient for Internet users to query and utilize on demand.

Agricultural website is supposed important for the digital ecological industry upgrading. Free upgrade function modules can be provided through the agricultural website to clearly introduce the technical features of various upgraded products and services. What's more, the agricultural website is applicable to build an economic environment coordinate the upgrading of industry and service industries, it is indispensable to open up the upstream and downstream supply chains and industrial chains, and establish a research and development supply and marketing platform for agricultural means enterprises, which can not only release the bidding demand to the downstream, but also show the advantages of bidding to the upstream. This is critical for the top-level design, because the optimization of economic

environment directly determines the success or failure of the upgrading. And in the context of Chinese path to modernization, to promote the top-level design of the upgrading of the digital ecological industry, the basic role of the public ownership economy should be brought into play to integrate and share the information platform for the production, circulation and use of relevant upgraded software and hardware.

There are other indispensable environments to be considered for the top-level design, such as political environment and social environment. To build a political environment systematically providing financial and tax policy support and institutionalized channels for upgrading is of decisive function, we must focus on the key issues of digital ecological industry upgrading, adjust measures to local conditions and implement policies accurately, and establish a management structure supplemented by market regulation and cooperatives. To build a social environment and develop the application and potential of agricultural digital ecological industry upgrading, it is competitive for Guangdong to have an international perspective and integrate into the international community. We should give play to the role of industry associations particularly digital or ecological associations, and create an international atmosphere, such as to layout the RCEP ecological civilization industrial hub in combination with characteristic ecology and catering culture to form an attractive border. Systematization in the top-level design for digital ecological industry upgrade helps to attract innovative talents from at home and abroad, pool innovative resources as well, so as to grasp the historical opportunities of RCEP.

3.1.2 Specific Construction of Digital Ecological Industry Upgrading System Function

System function is the very thing we want from all efforts in upgrading system. The functions required for the upgrading of the digital ecological industry can guide us to establish a target system to ensure the demand-side research and development, and promote the ecologicalization of science and technology, products and services, assist the transformation of scientific research achievements, so as to effectively manage the upgrading progress. It is clear that the upgrading must have the function of increasing farmers' interests, not limited to increasing income. We should also support personalized learning of relevant skills and free time, making efforts to popularize the benefits of upgrading through videos, cultural activities, publicity, and education of ecological civilization industry, in order to stimulate the beautiful vision and aspiration of innovative ecological environment and catering environment. The upgrading function can be constructed from the two aspects of productivity and production relations. In terms of productivity, build a monitoring system dominated by the sensing layer of the agricultural Internet of Things, the transmission layer of the Internet of Things, and the application layer of the Internet of Things, and then combine the Industrial Internet and the commercial network to build a decision-making system to organize agricultural production, circulation and services, so that it has the functions of automation, intelligence and unmanned. In terms of production relations, the agricultural expert system, production monitoring system and agricultural product safety traceability system are integrated to form a networked management system that links the main bodies

of the industrial chain. The system integrates agriculture, industry and service industries, with high efficiency, energy conservation, high yield and high quality. So as to promote agricultural industrialization, industrialization of industrial services and big data of service industry around the benefits of upgrading, and effectively promote green, circular and low-carbon development.

There are other indispensable factors for the systematic top-level design to specify, such as the target system of the digital ecological industry upgrade. The international experience of ecological upgrading requires that agricultural big data should be built on the basis of mechanization, aiming at increasing farmers' income, funding the research and development of infrastructure and general equipment needed for upgrading, matching education and upgrade function systems, optimizing financial and tax systems, and providing legal guarantee for upgrading digital ecological industries. Here, agricultural machinery, big data, general equipment, education and systems are all elements of the upgrading. The top-level design system should focus on the integration of upgrading elements accordingly. Beside these major upgrading factors, there are still minor ones. Hence, we should also take into account the construction of industrial policies, labor, capital, talent, technology, public opinion and other relevant elements, and then formulate a specific upgrading target system.

3.2 Networking the Upgrading Resource of Digital Ecological Industry

Network integration of agricultural Internet of Things and Industrial Internet, can support enterprise network research and development cloud platform to provide farmers with intelligent production management solutions, and popularize the use of cloud platform, to obtain data management of various agricultural intelligent equipment. The networking of upgrading resources, practically speaking, can then break the restrictions caused by land dispersion and link separation on industrial integration, achieve intelligence, unmanned and intelligent, systematically integrate the three industries, and form the big data production factors needed for industrial integration.

3.2.1 Cooperate to Promote the Network Infrastructure of Digital Ecological Industry

The agricultural digitization being the center of systematization, upgrades agriculture production and management links, all need to carry out with the help of the network. Network is the basic condition to get through all links of the supply chain in the digital ecological industry. Agricultural digital network foundation includes agricultural Internet of Things, Industrial Internet and business network. The Agricultural Internet of Things provides the information needed for big data analysis for the Industrial Internet, and provides lower machines for the execution of intelligent platform instructions, realizing the life cycle of agricultural products, production process data sharing, intelligent decision-making and accurate implementation. The commercial network opens up the circulation link, directly connects the industrial demand, and provides orders for the agricultural Internet of Things and the Industrial Internet. The key lies in the application of network information technology to promote the intelligence of industrial integration, and realize network operation, data management and online services. Thus, the construction of digital industry integration management system, accurate management of production,

circulation, and service and other links.

3.2.2 Integrate Agricultural Production and Circulation Data

The agricultural digitization differs from intelligent farms in highlighting the "ecological wisdom", stresses the digital combination of the three industries in upgrade process. It makes the whole process of agricultural production is automatic and intelligent, and connects the data in the circulation field, quickly responds to the market, and controls agricultural production intelligently, reflecting the character of wisdom. On the one hand, promote the construction of agricultural Internet of Things, improve the big data of the entire process of agricultural measurement and control, obtain the whole agricultural information, and provide digital resources for the Industrial Internet of Things; on the other hand, develop the network platform to get through the circulation link, let the agricultural Internet of Things connect the Industrial Internet of Things and the commercial network, upgrade the online sales of agricultural materials, agricultural products and services with the help of e-commerce, and improve the online direct selling channels. The reduction of intermediate links will reduce the corresponding waste of resources and internal volume, so as to finally realize the intelligent linkage of agricultural Internet of Things, Industrial Internet and commercial network. In this way, it can not only connect intelligent agricultural production equipment, but also link industrial and commercial supply chains, and intelligently manage all links of agricultural production, circulation, and service. This helps to make big data become the basic, supportive and decisive resource for the digital ecological industry upgrading. Only in this way, can we realize the ecological integration of the three industries, and meet the digital upgrade demands of "speak with data, make decisions with data, manage with data, and innovate with data".

3.3 Strengthen Social Incentives for Digital Ecological Industry Upgrading

Viewing from the perspective of incentive mechanism, the upgrading of digital ecological industry must combine the two aspects of economic interests and social benefits. For systematic digital ecological industrial upgrading, cooperate innovation, business models and talents attraction are not problems that can be solved by enterprises or employees along. They all however need socialized incentives, coordinate economic interests and social benefits, and jointly stimulate the upgrading.

3.3.1 Stimulate the Digital Ecological Industry Upgrading with Social Incentives

The agriculture provides food sustaining people's life, and farmers should then be respected by the whole society. To make young people want to upgrade agricultural digitization, in addition to high economic income, they also rely on government investment and education to realize the professionalization of farmers and improve their social status. International experience shows that, to earn profit is the responsibility of enterprises, and the responsibility of the government is to provide institutional incentives for social benefits. The United States has issued a series of laws, regulations and development plans to encourage the digitization of agriculture. British farmers are respected, and young people yearn for agricultural digitization. In addition to the high economic income, they also

benefit from the government investment to realize the professionalization of farmers and improve their social status. We should then combine the particular situation of Guangdong to formulate laws and policies based on social benefits to provide systematic services for the upgrading. Corresponding preparation should be targeted and integrated. The government trains farmers to use free agricultural digital products and services, and understands the latest agricultural science and technology, products and advantages, which can promote agricultural intelligence. We can also formulate relevant legal systems to develop social services and cultivate new intelligent farmers, such as building a new type of "Internet plus" vocational training, providing agricultural digital network teaching, promoting the agricultural products' certification platform of mobile terminals, and realizing the intelligent and convenient digital ecological industry upgrading training and education.

3.3.2 Encourage the Digital Ecological Industry Upgrading with Economic Interests

The agriculture upgrading of Israel focuses on the precise management of water-saving promotion and intelligent network control, and encourages the development of the international market to earn back huge profits, which promotes the increase of farmers' income, and farmers in turn upgrade with the increased income investment, forming a virtuous cycle. It can be seen that focusing on economic interests can stimulate the upgrading of ecological industries. Thus, the ecological research and development and promotion should be funded according to their biggest constraints, and the generated economic benefits and profits should be funded for new scientific and technological innovation to establish a virtuous cycle. In view of the spatial constraints of residents in the Greater Bay Area of Guangdong, we can also subsidize relevant innovation and promotion such as farmers' professional cooperatives and family-style "plant factory", and improve the market size and marginal benefits of the ecological integration of the three industries.

In the process of upgrading and implementation, responsibility system should be designed, e.g., the government is responsible for the free infrastructure construction, enterprises focus on the market orientation to open up the industrial chain, professional cooperatives focus on the large-scale application of agricultural digital products and services, and farmers focus on the personalized application of agricultural digitization knowledge. Join forces of upgrade projects can be achieved by division of labour with individual responsibility, government projects are responsible for the application of basic agricultural technology, enterprise projects focus on regional application system, and other projects focus on market development research.

4. Discussion

Centralized resources within digital ecological industry is very important to the success of upgrading process. After the implementation of the household contract responsibility system, the upgrading of underdeveloped Guangdong agriculture needs to overcome the biggest constraint of "resource dispersion" to promote the collective and intensive development. Farmers' professional cooperatives can function the link between the past and the following, and can try the stock cooperative system to develop ecological civilization industrial cooperatives, organize land, assets, and professional technology resources to become shareholders, and establish an ecological community of benefit sharing and risk sharing, so as to complement the advantages of modern enterprise system. And the agricultural digitization can be well incorporated into compulsory education. There are important subsections of the upgrading system left to be researched, better consultation for government may be provided through systematical dialectical analysis.

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