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# Closed-loop Supply Chain Mode of Ecological Agriculture Embedded with Knowledge Scheme

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**Abstract** According to the theoretical and practical experiences of agricultural supply chain both at home and abroad and the principles of profitability, efficiency, sustainable development, closed-loop supply chain mode of ecological agriculture embedded with knowledge scheme is constructed based on the urban and rural two-way logistics system. This mode is embedded with technical knowledge program of eco-crop cultivation and management during the logistics distribution of agriculture means of production. Profit is obtained through the connection between eco-agricultural production base and market. Support system of this mode is introduced, including technology, policy, management, human resources and financial support. Stage characteristics and evolutionary process of closed-loop supply chain of ecological agriculture are analyzed from the periods of incubation, growth, maturity to recession. Applicability of the closed-loop supply chain mode of ecological agriculture embedded with knowledge scheme is discussed from the aspects of capital, logistics network channels, and human resources coordination. Taking Guangxi Kanghua Ecological Agriculture Plantation Development Co. Ltd, as an example, operation process of supply chain is summarized; and the practical significance and popularization value of closed-loop supply chain of ecological agriculture embedded with knowledge scheme are verified.

**Key words** Knowledge scheme; Ecological agriculture; Closed-loop supply chain; China

With the improvement of agricultural productivity and the acceleration of urbanization, a large amount of labor forces are released from the agricultural industry and transfer to the secondary and tertiary industries. Thus, a lot of idle lands in rural areas need to seek the way of circulation to improve its productivity. Meanwhile, the over decentralized management of lands restrains the efficient use of land resources, restricts the agricultural mechanization and modernization, and affects the competitiveness of agricultural products and the farmers' incomes. Based on the actual supply chain of our agriculture, the author concludes a closed-loop supply chain mode of ecological agriculture embedded with knowledge scheme, so as to conduct scale operation of ecological agriculture in case of a relatively concentrated lands and provide references for the development of modern agricultural logistics.

## 1 The construction of the closed-loop supply chain mode of ecological agriculture embedded with knowledge scheme<sup>[1]</sup>

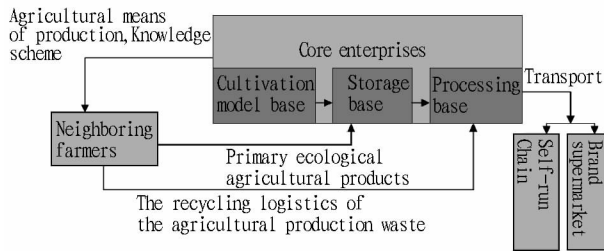
According to the principles of profitability, efficiency, sustainable development and the actual development of agricultural industrialization, a supply chain integration model with the leading enterprises of eco-agricultural industrialization as the core is constructed based on the urban and rural two-way logistics system from the perspective of supply chain strategy<sup>[2]</sup>.

In this model, based on a large number of leased farmlands and through the way of entrepreneurial operation, large-scale cultivation and intensive management, the leading enterprises of eco-agricultural industrialization seek to build a large

entrepreneurial model base for the cultivation and processing of eco-agricultural products, create brand agriculture, achieve the goal of developing an ecological agriculture with high yield, high quality, high efficiency and safety, and promote the development of agricultural industrialization. The outstanding feature of this model is that, embedded with technical knowledge program of eco-crop cultivation and management during the logistics distribution of agricultural means of production, the model put the farmers in a tendency to accept the agricultural means of production the enterprises provides through the exemplary role of efficient ecological agriculture.

The closed-loop supply chain of ecological agriculture is constructed on the basis of urban and rural two-way logistics system. The core enterprises, on the one hand, connect the market, they take the entrepreneurial operation and deliver a series of organic products to the consumers through the company's logistics system in order to reap a profit; on the other hand, they connect the eco-agricultural production base and transport the needed agricultural equipments and other means of production, technology and daily necessities to the farmers so as to achieve the space and time value of these objects. Meanwhile, the enterprises recycle and dispose the generated production waste by themselves or leave them to the professional waste sorting and processing company. In this way the core business complete the whole closed-loop supply chain of agriculture logistics (Fig. 1), and have significant profit margins in all processes. The profits are mainly from the sales of eco-organic agricultural products and farm equipments, eco-agricultural technology transfer and agricultural waste recycling.

In the operation of closed-loop supply chain of ecological agriculture embedded with knowledge scheme, the profit mode of core enterprises is; the agricultural logistics is operated with the help of the exemplary effect of modern closed-loop agricul-



**Fig. 1 The closed-loop supply chain mode of ecological agriculture embedded with knowledge scheme**

tural base and the embedment of the scientific agricultural production services program. The sales of eco-organic products are only part of the incomes of the company's main business; most of the profits come from the providence of pesticide, fertilizer, machinery and other agricultural means of production and scientific cultivation program services to the neighboring farmers. The reason why farmers accept the company's agricultural products is that they can at the same time get the soil measurement, reasonable fertilization and other cultivation knowledge programs the company provides; they accept the company's agricultural technology services because the company's procurement of agricultural products removed the farmers' worries and filled them with more optimism about market prospects. The company does the research and develops its own breeding to supply improved variety. Fertilizers, pesticides, farm machinery equipments, etc are purchased jointly through the company's logistics system, so as to guarantee the supply of them at the lowest price to the company's own production base and the surrounding farmers. At that time the company becomes the agent and logistics providers of agricultural products, it embeds the agricultural production and management techniques into the agricultural equipments sales and logistics process in order to expand the scale of sales and logistics, providing the company with stable cash flow. Of course, the recycling of agricultural production waste can also bring some revenue.

## 2 The support system of the Closed-loop Supply Chain Mode of Ecological Agriculture Embedded with knowledge scheme

**2.1 Technical support**<sup>[3]</sup> The construction of the Closed-loop Supply Chain Mode of Ecological Agriculture Embedded with knowledge scheme calls for strong technical supports. The first support is advanced cultivation techniques of ecological agriculture, such as the cultivation of improved variety, scientific field management, mechanized cultivation, large-scale operation, etc, which demand the experts provide services on operation specifications, standard practices, technical training, on-site guidance and other aspects, so as to form a technical support system; the second is the techniques of modern logistics, including the agricultural harvest, storage, transportation, processing and packaging techniques, which demands the operation by skilled agricultural industry workers and on-site guidance of specialized technical personnel.

**2.2 Personnel support** The construction of the Closed-loop

Supply Chain Mode of Ecological Agriculture Embedded with knowledge scheme calls for a wide range of personnel support. The core enterprises need to do a large scale synergistic integration of human resources of the contract farmers, grass-roots village organizations, agricultural experts, employees, agents and other interest groups in the supply chain. For example, in crop cultivation, the agricultural companies take the method of hiring local farms and transferring them into agricultural industry workers. Both the institutions and personnel in the management areas and operation areas of the growing base are under the unified management of agricultural companies and given appropriate pay according to the tasks and requirements of their jobs, in this way could the interests of base managers be connected with the company's interests, which fully mobilize their participation in the management of cultivation. During the distribution process of agricultural equipments in the agricultural supply logistics, the company will implant the agricultural experts' programs about agricultural production and management and at the same time, employ some agricultural experts and logistics experts as technical advisers, and prefer employees with high education and rich experiences.

**2.3 Policy support** As the construction of closed-loop supply chain model of ecological agriculture need to rent a large number of farmers' lands to grow ecological crops, the principles and policies about the land transfer and preferential policies on grain subsidies should be taken full use of, the corporation with local government and agricultural departments need to be strengthened, using the favorable policy of agricultural industrialization and establishing a good relationship with the rural grass-roots organizations<sup>[4]</sup>.

**2.4 Management support** During the construction of closed-loop supply chain model of ecological agriculture, the core enterprises' capabilities of resources integration should be taken full use of, both the agricultural production and logistics should take the entrepreneurial operation. The cultivation base adopt the mode of "scale planting and patch management", the core agricultural enterprises formulate uniform technical specifications on crop cultivation, field management and pest control, propose the technical solutions and operation steps in the whole process of crop cultivation and conduct uniform technical standards; the enterprises conduct unified procurement of fertilizers and pesticides and make uniform deployment, and establish an employment system suitable for large-scale crop cultivation and processing so as to regulate the management, simplify the process and reduce costs.

**2.5 Financial support** In the construction of closed-loop supply chain model of ecological agriculture, the rent of farmers' land, purchase of agricultural machinery, procurement of logistics equipments and the employment of agricultural experts all require substantial initial capital investment. Thus, in the financial aspect, in addition to the government's preferential loans, we should also actively broaden the financing channels and expand the funding sources through financing, equity participation and leasing, etc, to support the smooth running of the supply chain.

### 3 Stage characteristics and evolutionary process of the closed-loop supply chain of ecological agriculture<sup>[5]</sup>

According to the development features of the agricultural supply chain in its various stages of growth, it can be divided into four periods: the period of incubation, growth, maturity to recession. Different stages have different management focuses. Technological advances, changes in demand and resource constraints are the three major driving forces to promote the evolution.

**3.1 The period of incubation** In this period, the main task of the core enterprises is to analyze the market opportunities of eco-agricultural products, carefully choose partners, identify their core competencies and determine the supply chain strategy. The management focus of this period is to adjust the organizational structure of enterprises to the changes in business processes and transfer the functional management to process management. And also to investigate and select the potential suppliers of agricultural equipments and distributors of agricultural products, to educate the supply chain managers so that they can deeply understand the management concept of systematic integration, realizing the common wish of achieving maximum overall interests of the supply chain.

**3.2 The period of growth** The management risks in this period are mainly from the choice of the members of supply chain and the integration of information system, therefore, the management in this phase focuses on information sharing and coordination among enterprises. Focus on core enterprises and taking the EDI, Internet and other modern information technologies, an information sharing mechanism connecting both the upper and lower ends of the supply chain is established and the understanding and communication between the cooperative enterprises are enhanced, forming integrative competitive advantages. The evolution from the period of incubation to that of growth is mainly driven by the enterprises' technological upgrading and resource integration.

**3.3 The period of maturity** In this period, the relationship between the upper and lower ends of the supply chain tends to stabilize and the overall yield is relatively high and stable. The management focus of this period is to ensure the rational allocation of proceeds under the premise of the effective transmission of information so as to continuously encourage the member enterprises and farmers. The communication should be strengthened and a performance appraisal system of the supply chain should be built. Technology and resource are still the driving forces in the transition from the period of growth to that of maturity, but the expanding external demand is the main driving force.

**3.4 The period of recession** As the external demand decreases, the agricultural life cycle comes to the end and the agricultural supply chain is gradually reaching the replacing stage, the key point of this stage is to ameliorate the exit mechanism of the supply chain. Then the closed-loop supply chain completes a life cycle.

### 4 The applicability analysis of the Closed-loop Supply Chain Mode of Ecological Agriculture Embedded with knowledge scheme

It is theoretically feasible to embed the agricultural logistics services with the knowledge scheme of agricultural production, but in practice, the following factors still need to be seriously considered.

**4.1 The aspect of logistics network channels** The core enterprises in the closed-loop supply chain commit all logistics services from the procurement, distribution and delivery of the agricultural equipments to the purchasing, storage, distribution, processing and transport of agricultural products, proposing a great challenge to its logistics network. As the traditional channel of rural supply and marketing cooperatives gradually loses its role, the input of the enterprises' agricultural equipments should rely on self-built network channels, so does the output of the agricultural products rely on the self-built regional distribution centers, agents, self-run chains and other channels to reach the consumers<sup>[6]</sup>. To establish and ameliorate these channels is a systematic project.

**4.2 The aspect of human resource coordination** The core enterprises should have a group consisting of the experts with high education and high titles. The employed agricultural industry workers, contract farmers, village organizations entrusted with management, suppliers, distributors and other interest groups in the supply chain should be brought into the corporate human resource strategy. How to well coordinate different entities to work for the overall objective of the supply chain becomes a key point in the application of this mode.

**4.3 The aspect of capitals** For the core enterprises in this mode, the initial contract of large lands, employment of agricultural workers, seeking of channels, operation of enterprises, etc, need a lot of money, meanwhile, the superiority and effectiveness of the operation mode cannot be seen until one or two years later, during which the source of funds becomes a major issue facing the enterprises. Therefore, the core business should have a solid financial strength and better financing channels; otherwise, it will fall into the risk of funding strand breaks before the investment recovery.

### 5 The case study

Guangxi Kanghua Ecological Agriculture Plantation Development Co. Ltd is a private enterprise specialized in the eco-agricultural investment and research, crop cultivation, research and development of agricultural by-products, bio-fertilizers, ecological agricultural tourism, and the development of farmland and water conservancy facilities. It was founded in August, 2008 with the registered capital of 50 million. The company has 486 employees, among which 110 are in the headquarter, 45 with high titles and Master degree or above, 80% have college or higher education<sup>[7]</sup>.

Relying on Gulin Bureau of Agriculture, the company has strong research and service capabilities. It employs several rice experts as long-term technical advisers, and hires key techni-

cians of the promotion station, soil and fertilizer station, plant protection station and seed station as technical backing. It forms long-term strategic cooperative partners with Ruihua Environment Protection Science and Technology Co. Ltd, the Chinese Academy of Agricultural Sciences and emerging state-owned enterprises, which provides strong technical support and market base for the enterprise. The company's profits come mainly from the sales of organic rice with high quality and high nutrition, edible mushroom (such as, Nongyou Huazhen NO. 1, Zhongzheyong No.2838) and other eco-agricultural products. The cultivation technology transfer of ecological crops and the sales of the agricultural equipments are the main source of profit.

The company has a production base with 38 700 hm<sup>2</sup> rice, it integrates the planting, processing, packaging, warehousing, distribution and sales of the alimentary crops, edible mushroom and sweet corns as a whole. A service system of modern agricultural production, processing, logistics distribution has been built, which covers cross-regional distribution of agricultural products, joint development of agriculture and logistics, logistics information and emergency logistics, integral services to the employment of the migrant workers.

The agricultural supply logistics, production logistics and distribution logistics are integrated and completed within the company, thus creating a modern, informational and efficient agricultural industry supply chain of eco-organic rice, sweet corns and other agricultural products. As a leading enterprise in the agricultural industry with strong capabilities of logistics operation, resources integration and human resources coordination in the integral development mode of agricultural logistics supply chain, the company's agricultural logistics reduces the intermediate links and completes the two-way logistics of agricultural products into the cities and agricultural materials and supplies into the rural areas within the same distribution system, which, as a result, reduce the cost and speed up the pace of the agricultural products entering into the processing part and urban market.

The operation of the Closed-loop Supply Chain Mode of Ecological Agriculture Embedded with knowledge scheme of the Guangxi Kanghua Ecological Agriculture Plantation Develop-

ment Co. Ltd embed the practice of agricultural logistics with the technical knowledge of agriculture, which is a good attempt both in theory and in practice. Although this mode has some problems in the construction of the supply and marketing channels, human resources coordination and financial difficulties, etc, it still has practical significance and popularization value.

## 6 Conclusions

The Closed-loop Supply Chain Mode of Ecological Agriculture Embedded with knowledge scheme is an advanced agricultural management mode based on modern agricultural logistics, it studies, not only the logistics configuration of agricultural production itself, but also the scientific operation of the logistics before, between and after the agricultural production, achieving the organic linkage of supply, production, transportation, processing and marketing and keeping in an optimal operation state with the market before, between and after the agricultural production. Taking full use of its financial, technological, market, information, and management advantages as a leading township enterprise, this mode puts together those scattered farmers into the supply chain, which should be actively promoted.

## References

- [1] XU YM. Agricultural logistics model research under the system of urban and rural two-way commerce flowing[D]. Guilin: Guangxi Normal University, 2008. (in Chinese).
- [2] SUN H, ZHAO QZ. The structure types of agriculture supply chain [J]. China Storage & Transport, 2005(3):52–55. (in Chinese).
- [3] CUI PS, YUAN YD. Take advantage of Shandong postal logistics by post and enterprise cooperation[J]. Communications Today, 2003(9):65–66. (in Chinese).
- [4] CHEN YG, WU Y. Postal logistics: new mode of rural logistics operation[J]. China Economist, 2005(12):110–111. (in Chinese).
- [5] ZHOU HM, LI BQ. The life cycle of supply chain[J]. Industrial Engineering and Management, 2003(4):51–54. (in Chinese).
- [6] WANG CW, WU ZH. An analysis on the personalities of the agricultural supply chain[D]. Tai'an: Shandong Agricultural University, 2006. (in Chinese).
- [7] LIU SC, LI T. Empirical analysis on construction of the agriculture supply chain—a case study of Yunnan Province[J]. Contemporary Economics, 2007(8):106–107. (in Chinese).

## 知识方案植入型生态农业闭环供应链模式研究

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**摘要** 根据国内外有关农业供应链的理论和实践经验, 遵循利益性、效率性、可持续发展原则, 立足于城乡双向物流体系, 构建了一种知识方案植入型的生态农业闭环供应链模式, 该模式在农业生产资料的物流配送过程中植入了生态农作物种植和管理的技术知识方案, 通过与生态农产品生产基地及市场的连接实现利润。介绍了该模式的支持体系, 包括技术、人力资源、政策、管理水平和财务支持。分析了生态农业闭环供应链从孕育期、成长期、成熟期到衰退期的阶段特点及演化进程。从物流网络渠道、人力资源协同、资金 3 个方面探讨了知识方案植入型生态农业闭环供应链模式的适用性。以广西康华生态农业种植发展有限公司为例, 概述了其供应链运作过程, 验证了知识植入型生态农业闭环供应链的现实意义和推广价值。

**关键词** 知识方案; 生态农业; 闭环供应链