



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Construction of Network Management Information System of Agricultural Products Supply Chain Based on 3PLs

GAO Shu-jin, YANG Qing-xian*

College of Economics and Management, Sichuan Agricultural University, Ya'an 625014, China

Abstract The necessity to construct the network management information system of 3PLs agricultural supply chain is analyzed, showing that 3PLs can improve the overall competitive advantage of agricultural supply chain. 3PLs changes the homogeneity management into specialized management of logistics service and achieves the alliance of the subjects at different nodes of agricultural products supply chain. Network management information system structure of agricultural products supply chain based on 3PLs is constructed, including the four layers (the network communication layer, the hardware and software environment layer, the database layer, and the application layer) and 7 function modules (centralized control, transportation process management, material and vehicle scheduling, customer relationship, storage management, customer inquiry, and financial management). Framework for the network management information system of agricultural products supply chain based on 3PLs is put forward. The management of 3PLs mainly includes purchasing management, supplier relationship management, planning management, customer relationship management, storage management and distribution management. Thus, a management system of internal and external integrated agricultural enterprises is obtained. The network management information system of agricultural products supply chain based on 3PLs has realized the effective sharing of enterprise information of agricultural products supply chain at different nodes, establishing a long-term partnership revolving around the 3PLs core enterprise, as well as a supply chain with stable relationship based on the supply chain network system, so as to improve the circulation efficiency of agricultural products, and to explore the sales market for agricultural products.

Key words 3PLs(third party logistics), Agricultural products supply chain, Network management information system, China

3PLs means that production enterprises entrust the logistics activity to the professional logistics service firms in order to concentrate efforts on core business, to keep close contact with logistics enterprise through information system, and to achieve a logistics operation and management mode with full control in logistics. According to the 3PLs requirements for information technology, supply chain management information system based on 3PLs is a supply chain management mode with 3PLs enterprises as the core, using EDI technology, GIS/GPS system, B/S mode and other technologies. Integration, processing and application of 3PLs enterprises in supply chain management information system are fully applied in order to reduce the cost of logistics and to improve the service level of logistics^[1].

At present, management information technology in China is just at the initial stage. The existing management information system offers insufficient information for the 3PLs enterprises which are engaged in the circulation of agricultural products. Besides, its construction of logistics data processing system is imperfect, having not realized the truly professional 3PLs enterprises for the circulation of agricultural products with information technology. At the same time, 3PLs enterprise for agricultural products has just started in China. And logistics applied in the agricultural supply chain with 3PLs enterprise as the core is time-consuming, inefficient and low-level, which can hardly meet the needs of the rapid development of rural market and

social productive forces. Therefore, it is particularly important and urgent to construct a management information system for agricultural products supply chain under the current Internet environment. Problems in the management of the supply chain of agricultural products are analyzed, and a network management information system of agricultural products supply chain based on 3PLs is constructed in order to offer references for the information management in the supply chain of agricultural products in China.

1 Necessity of constructing the network management information system of agricultural products supply chain based on 3PLs

Agricultural products are seasonal, perishable and vulnerable. With the improvement of income level, consumers have increasingly high requirements for the diversification, personalization, just-in-time nature, and environment protection of agricultural products, which requires faster, more professional, and better organized logistics. At the same time, supply chain of agricultural products has the characteristics of the special purpose of funds, the uncertainty of market, and the unbalanced development of market. Thus, the support of supply chain management information system is needed during the circulation of agricultural products. Construction of market integration, as well as the integration of production, supply and marketing, urgently needs a new management information system of agricultural products, as well as an accompanying legal sup-

port system, in order to reduce the cost and to increase the profit for agricultural enterprises. And the application of 3PLs in the supply chain of agricultural products can solve this problem. Therefore, we should give full play to the central hub function of 3PLs enterprises in agricultural products supply chain, increase the input in the informationization of agricultural products supply chain, and promote the construction of logistics operation system and management information system.

1.1 Improving the overall competitive advantage of agricultural products supply chain by 3PLs 3PLs is a new logistics organizational form established by modern information technology, as well as a kind of complementary and win-win strategic alliance by signing contract with the party being served. Taking 3PLs as the professional and core enterprise in the production and circulation of agricultural products can help to realize resource consolidation of the construction and organization of the whole supply chain of agricultural products. The specialization of raw materials and the service for product distribution have greatly improved the logistics efficiency of traditional enterprise. At the same time, construction of the management information system of agricultural products supply chain based on 3PLs has made up for the shortage of information in agricultural market, has improved the efficiency of the flow of agricultural products, has connected all the links in the supply chain into an organic whole in an reasonable and effective way, and has enhanced the overall competitive advantage and economic benefits. 3PLs platform has greatly brought down the production and circulation processes of traditional agricultural enterprises, and has reduced the costs in raw material procurement and product distribution, so as to better adapt to the changes in market demand, to realize the rational distribution of resources, and to improve the overall competitiveness of the supply chain of agricultural products.

1.2 Changing the homogeneity management to specialized operation of logistics service by 3PLs Due to the characteristics of agricultural products, market requirement for logistics varies widely. Since traditional enterprises try to obtain the competitive advantage, there is fierce market competition in commodity circulation. Therefore, behavior of logistics market shows the characteristics of homogeneity and the profit is getting lower and lower. In order to seize the customer, some enterprises even take a loss. 3PLs enterprises share business risk with partners and carry out operation according to the items number, time and cost of customer by integration and utilization of resources. As a means of the supply chain integration of agricultural products, specialized operation of 3PLs can help the stakeholders of supply chain to obtain more demand information of agricultural products, and can reduce the circulation cost of agricultural products.

1.3 Alliance of the subjects in supply chain nodes of agricultural products by 3PLs 3PLs stresses the relationship of "mutual complementarity, benefit sharing, information sharing" among the stakeholders in different nodes of supply chain. Development of the agricultural producer, supplier and retailer is limited if they rely only on their own resources. 3PLs

enters into the outside service market, integrates the resources through the way of strategic alliances, ensures that the subject focuses its attention on core business, reduces the cost by scale effect, enhances the anti-risk strength, and helps to achieve quick response to market demand by information sharing^[2]. At the same time, contract-oriented 3PLs enterprises unify the interests of all subjects in supply chain of agricultural products, emphasize the strategic partnership of both parties, and alleviate market competition of related industries in agricultural markets. Subjects in both downstream and upstream of the supply chain share information and establish long-term partnership with 3PLs enterprises as the core.

2 Construction of the network management information system of agricultural supply chain based on 3PLs

2.1 Construction of structural system 3PLs platform is used to offer network communications and system services to the subjects in agricultural supply chain. Fig. 1 illustrates the structural system of network management information system of agricultural supply chain based on 3PLs.

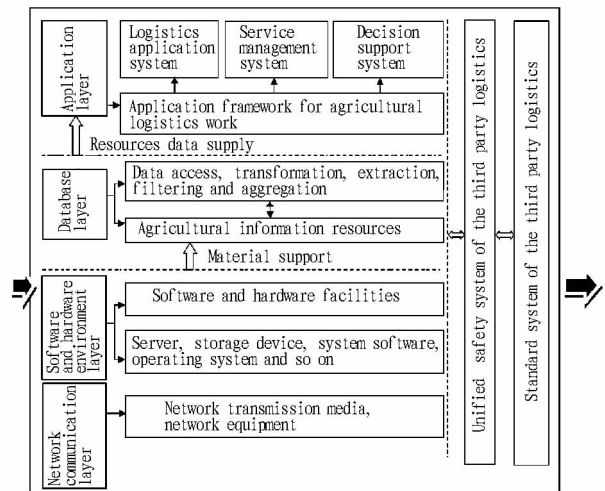


Fig. 1 Structural system of network management information system of agricultural supply chain based on 3PLs

Fig. 1 illustrates that the basic hardware of the system is combined by the network transmission media and network equipment, that is the network communication layer. Hardware facilities, corresponding system software, operation system and netmanager software together constitute the software and hardware environment layer.

This layer provides necessary software and hardware facilities for 3PLs enterprises during the data storage and management of agricultural products. Database layer is responsible for the management of data source in agricultural information resources and network systems, and offers data integration to the application layer. 3PLs standard system includes the overall standard, network infrastructure standard, application support standard, application standard, information security standard,

and management standard. Safety system of 3PLs includes the security management, security infrastructure, and security service.

This system is composed of 7 function modules, such as the centralized control module, transportation process management module, material and vehicle scheduling module, customer relationship module, storage management module, customer query module, and financial management module (Fig. 2), the function of which is to ensure the information fluency and system security of 3PLs enterprises during the operation and integration of resources. These modules have improved the service module of different nodes in agricultural supply chain and have reduced the operation risk of system, so that the system becomes more structured, perfect, and rational.

2.2 Framework of management system Based on the existing research result, the business and module of modern lo-

gistics management, and the management information systems, Fig. 3 reports the management system of internal and external integrated agricultural enterprises according to the circulation of agricultural products from the manufacturer, supplier, and retail terminal to the consumer^[3-4].

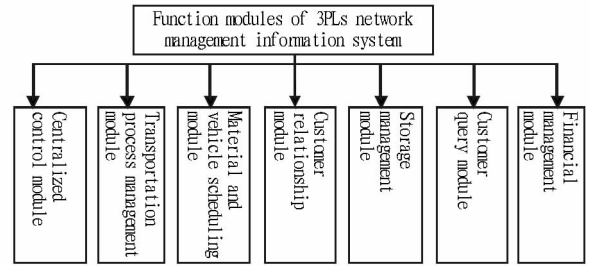


Fig. 2 Function modules of 3PLs network management information system

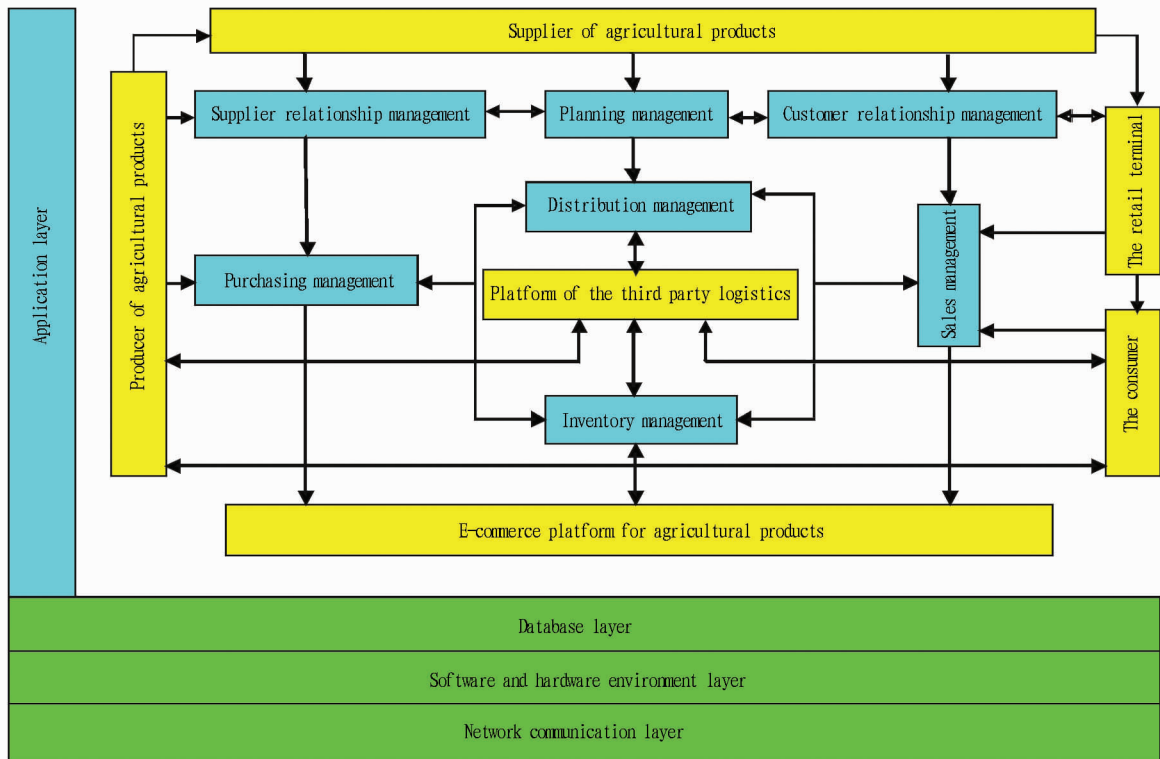


Fig. 3 The management system of internal and external integrated agricultural enterprises

Fig. 3 shows the framework of network management information system of agricultural supply chain based on 3PLs. The whole system, running under an open 3PLs, is formed by four layers of network communication layer, software and hardware environment layer, database layer and application layer. In the application layer, 3PLs, as the core of management information system of agricultural supply chain, plays the role of information processing center. It mainly manages the plan, inventory, and other subsystems, supervises subsystem through supplier relationship, conducts information interaction with procurement management subsystem and the supplier, and carries out information interaction with the supplier, producer and consumer through customer relationship management subsystem and

sales management subsystem. Besides, 3PLs is also responsible for logistics management and control through the distribution management subsystem. Management of 3PLs mainly includes the 7 modules of purchasing management, supplier relationship management, planning management, customer relationship management, sales management, inventory management and distribution management. Through the effective integration and coordination between 3PLs and the business with partner at the downstream and upstream of agricultural supplier chain, management system of internal and external integrated agricultural enterprises is formed using the logistics information system to realize the integration of logistics and information flow.

(To page 64)

Making a long-term and stable agricultural development policy can help to promote the rapid development of agriculture. Therefore, we should increase investment and subsidies in agriculture, especially the subsidies for grain production, and gradually turns it into policy. The core of farming system reform and optimization is the high-quality variety improvement and high-yield farming and cultivation techniques. Promotion and application of future biotechnology, information technology, and new material technology will also have a huge effect on promoting the development of agriculture. Therefore, based on the actual situation of Shandong Province, we should develop modern agriculture, establish a scientific and rational farming system, and realize the sustainable development of agricultural production according to the influencing factors of population, agricultural production, urban development and natural conditions.

References

- [1] LIU XH. On agricultural intensification and sustainability in China [J]. *Research of Agricultural Modernization*, 2000, 21(1):1–8. (in Chinese).
- [2] LIU XH, CHEN F, GAO WS. On characteristics of farming system and strategic priority for the east, middle and west zones in China [J]. *Research of Agricultural Modernization*, 2004, 25(5): 321–329. (in Chinese).
- [3] XU P. Evolution and its historical reasons of tillage system in China [J]. *Journal of Pingyuan University*, 2001, 18(3): 8–10. (in Chinese).
- [4] Bureau of Statistics of Shandong Province. *Rural statistical yearbook of Shandong* [M]. Beijing: China Statistics Press, 2008. (in Chinese).
- [5] Agriculture Department of Shandong Province. *Modern agriculture in Shandong* [M]. Jinan: Shandong Science and Technology Press, 2000. (in Chinese).

- [6] HAN HF, ZHOU XB, NING TY, *et al.* Features of modern farming system and development strategy in Shandong Province [J]. *Crops*, 2010(1): 1–5. (in Chinese).
- [7] LI ZJ, WANG Y, HAN B. Current situation, problems and solutions for modern farming system in Shandong Province [M]// *Farming System of China Agricultural Society. Modern agriculture and farming system construction*. Nanjing: Southeast University Press, 2006: 232–240. (in Chinese).
- [8] LIN X, JIA XW. Influencing factors and optimization of agricultural listed companies in China [J]. *Asian Agriculture Research*, 2009, 1(7):41–44.
- [9] LI CG. Countermeasures and investigation of land circulation in less developed agricultural area of Henan Province, China [J]. *Journal of Anhui Agricultural Sciences*, 2010, 38(21): 11577–11579. (in Chinese).
- [10] GE F, HUANG J, MU YY. Comparative analysis on the effects of income structure on consumption level of rural residents in eastern and western China—a case study on Jiangsu and Xinjiang Province [J]. *Asian Agriculture Research*, 2009, 1(8):1–5.
- [11] MA ZJ. Analysis on the status of impoverished population and contradiction of economic development in Qinling-Bashan Mountainous area—A case study of Hanzhong City, Shaanxi Province [J]. *Journal of Anhui Agricultural Sciences*, 2010, 38(24): 13458–13459, 13461. (in Chinese).
- [12] HUANG J, GE F, MU YY. On the relations between income structural change and consumption of rural residents in China [J]. *Asian Agriculture Research*, 2009, 1(8):11–14, 48.
- [13] XIONG JY, CHEN XW, LI M, *et al.* Research on the agricultural development and economic growth in new era [J]. *Journal of Anhui Agricultural Sciences*, 2010, 38(24): 13443–13445, 13449. (in Chinese).
- [14] LI Q, LI HY. Relationship between the industrial structure and economic growth of Guangdong Province [J]. *Asian Agriculture Research*, 2009, 1(2): 29–33.

(From page 59)

In general, 3PLs enterprise is still in the initial stage in China. Management information system of agricultural supply chain is not perfect, which can not meet the current needs of the rapid development and agricultural products circulation in rural China. Thus, there is an urgent need to build a new mode of agricultural logistics, so as to reduce the process of sales turnover, to lower the production cost of 3PLs enterprises, to improve the circulation efficiency of agricultural products, and to expand the sales market of agricultural products.

3 Conclusion

Developing modern 3PLs is an inevitable trend of market development. Design and development of management information system based on 3PLs can bring spillover benefits to the producer, supplier and retailer of agricultural products. Under the current Internet environment, management information system of agricultural supply chain based on 3PLs must be established based on the specific characteristics of operation mode and the actual business situation of 3PLs enterprises, so as to establish a management information system suitable for a given enterprise. From the perspective of

overall integration of resources, the network management information system of agricultural supply chain based on 3PLs established has connected the interests of different nodes in agricultural supply chain into an organic whole, has effectively eliminated the barriers to information flow, and has increased the profits of agriculture-related enterprises and farmers. At the same time, according to the characteristics of agricultural enterprises in China, a rational agricultural products logistics mode of internal and external integrated agricultural enterprise is established, which offers a reference for the management of agricultural supply chain in China.

References

- [1] WANG J. The applied research of GPS/GIS in third-party logistics enterprises [J]. *Science and Technology Management Research*, 2009(12):214–216. (in Chinese).
- [2] SHAO BJ. *Electronic commerce introduction* [M]. Beijing: Higher Education Press, 2006:275. (in Chinese).
- [3] JIA DQ, KE XS. A study on agricultural products logistics operational mode based on information flow [J]. *Chinese Agricultural Science Bulletin*, 2007(10):263–267. (in Chinese).
- [4] WANG XY. The information construction course of agribusiness [J]. *Journal of Agricultural Mechanization Research*, 2006(3):44–46. (in Chinese).