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Synergetic management system of Agri-product logistics based on cloud service platform

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ABSTRACT

Many people focus on research of computing cloud platform technology, but few people know management about cloud platform. In this article, it takes agri-product logistics as a case, discusses how to build synergetic management system of agri-product logistics based on cloud service platform from its layers and mechanism view. The synergetic management system can be divided into 3 layers: strategy layer, operation layer and support layer. And its mechanism includes the self-organizing mechanism, negotiation mechanism, trust mechanism, interest mechanism and punishment mechanism etc. It can improve efficiency of the agri-product logistics by synergetic management system based on cloud service platform.

KEYWORDS

Agri-product logistics; Cloud platform; Cloud service; Synergetic mechanism.

INTRODUCTION

With the improvement of living standards, people raised the safe and fresh requirement of agri-product higher and higher. However, agri-product how to be sent by safe, fast and low-cost from producer to consumer has always been the challenge of agri-product logistics. Now cloud computing combined with agricultural logistics service supply chain (Agri-LSSC) may provide a possible solutions. Sun Hongling et al.(2013)advice that cloud computing combined with cold chain logistics;[1] Yu Zhenhan (2012) build agri-product cloud logistics models including "In the cloud", " offer-side ", "demand-side" and "integrated side" four modules.[2] Chen Liancheng (2013)finds that technology of cloud computing not only enable traceability of agri-product access to the site's responsiveness greatly improved but also improve the performance of Web sites visited.[3] By these documents, we can find that most scholars study agri-product logistics from technical view of cloud computing and a few scholars take management view to suggest how to manage the agri-product logistics based on cloud service platform.

In the cloud service platform of agri-product logistics, suppliers publish information and demanders order them on-demand. After that, related logistics service suppliers provide synergetic delivery to complete order tasks. The model is simple but there is a complex organizational relationship among suppliers, demanders, cloud servicer, financial institution and other value-added bodies. How to make the enterprises into full play their respective advantages in the platform and how to build synergetic management system of agri-product logistics based on cloud service platform for improving the efficiency of agri-product logistics is an important practical significance.

THE CONTENTS AND ADVANTAGES OF AGRI-PRODUCT LOGISTICS BASED ON CLOUD SERVICE PLATFORM

The contents of Agri-product logistics based on cloud service platform

Agri-product logistics based on cloud service platform takes cloud computing, Internet of Things, Big Data and other advanced information technologies as its technology support, and synergetic Supply Chain Management (SCM)as its management method. Its aim is to provide efficient, high quality, low cost, flexible logistics service for agri-product logistics demanders though the process of collecting various information resources of agri-product logistics to virtualize them into information.

The main body of agri-product logistics based on cloud service platform

The main body of agri-product logistics based on cloud service platform includes suppliers, demanders, cloud servicers, financial organizations, government and so on. Suppliers is to provide services for agri-product logistics such as warehousing enterprises, transport enterprises, packaging enterprises, cloud servicers and so on; Demanders who publish demand information of agri-product logistics or order supply information of agri-product logistics from the cloud platform on-demand; Cloud servicers such as tracking of agri-product logistics servicers who provide services of cloud computing, Internet of Things and Big Data; financial organizations provide settlement of accounts, transfer of account and other financial business; Relevant government departments as well as other value-added services institution provide policy advisory services, online electronic signature service and so on. All the enterprises in agri-product logistics based on cloud service platform who support each other, cooperate together to maintain normal operation and make synergetic distribution of agri-product logistics become true. Its relationship shows in Figure 1.

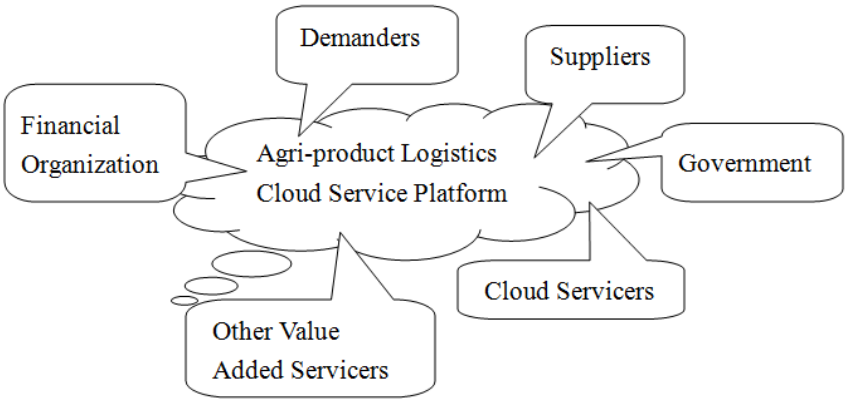

Figure 1 : Relationship among the main bodies of agricultural products logistics cloud service platform

The business functions of agri-product logistics based on cloud service platform

The main service object of agri-product logistics based on cloud service platform is agri-product logistics services of suppliers and demanders. Relevant enterprises exist loosely coupled relationships, they require cloud platform can provide more integrated services to achieve multi-granularity and multi-scale control.

The specific business functions of agri-product logistics based on cloud services platform include the following relationship: suppliers of agri-product logistics publish logistics information in the cloud platform; The cloud servicers who manage cloud platform examine and verify the information and assess the qualifications of the suppliers; demanders of agri-product logistics search logistics information in the cloud platform, order service resources of agri-product logistics on-demand by real-time tracking of agri-product logistics or distribution; When the transaction is completed, suppliers and demanders of agri-product logistics can carry out settlement accounts, transfers accounts and credit rating directly in the cloud platform. Furthermore, other services also provide relevant value-added service in the cloud platform, such as government departments provides policy consultation and electronic signature service, the weather bureau provides real-time weather situation and so on. As shown in Figure 2.

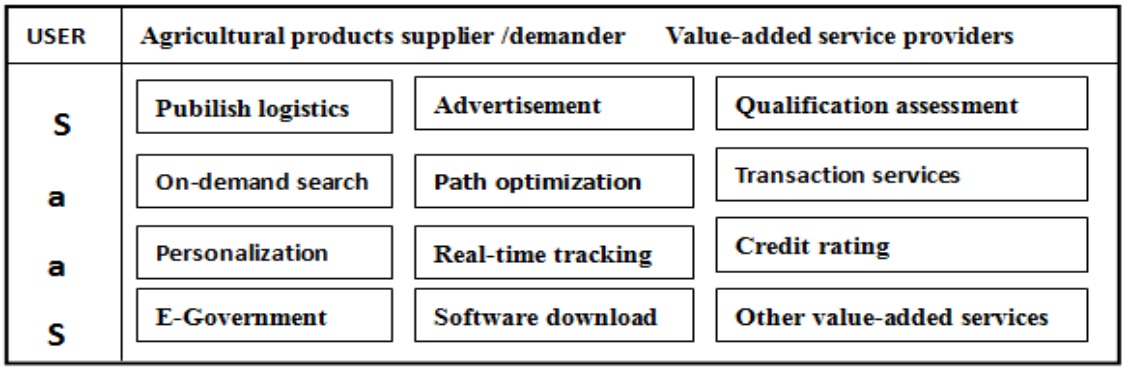

Figure 2 : The business functions of agri-products logistics based on cloud service platform

The competitive advantage of agri-product logistics based on cloud service platform

At present, agri-product logistics channel in China is obstructed, logistics technology and infrastructure lag behind developed country and information construction is not sound, transact way is backward.[5] Developing cloud services and building the cloud service platform is the core of agri-product logistics to foster its synergetic system of information management. So enhancing synergetic management of cloud platform also can improve efficiency and get more competitive advantage of agri-product logistics in China.

Lower search cost

Agri-product logistics resources have different forms and come from different regions. If they showed in cloud service platform as cloud, demanders of agri-product logistics can quickly search what they want and could reduce searching cost.

Improve quality, safety and traceability management level of agri-product logistics

Using cloud computing, IT technology, Big Data and other ubiquitous network technology, we can get anything from the information acquisition terminal. It provides information cloud not only includes origin of the agri-product, agricultural harvest time, specific inspection and quarantine information, but also shows which logistics enterprises participate in the distribution, what kind of logistics services they provided, where agri-product is in real-time. That is what we can master information of agri-product logistics from cloud service platform.

Order on-demand

Demanders of agri-product logistics obtain information from cloud service platform in two ways. One is to find the cloud information actively through the cloud platform, another is passive to accept published cloud information. Demanders of agri-product logistics select information and rearrange new composite of logistics distribution information to meet their requirements. For example, big peaches have a huge market in Beijing, but they are too easy to rot, so demanders of agri-product logistics would choose air cold transport and automobile cold transport for synergetic distribution, which make big peach arrive at the destination in the first time.

Gain real-time dynamic information

Cloud service platform can show real-time dynamic information which transferred back by IOT and Big Data etc. internet tech. According to the information transmitted back, these enterprises in the cloud platforms adjust their agri-product integrated logistics solutions to maximize utilization of agri-product logistics resources.

FRAMEWORK OF SYNERGETIC MANAGEMENT SYSTEM

From the viewpoint of System, the enterprises in the cloud platform enhance internal and external communication and coordination, closely linked to form a "seamless" service network which aim to “same network, same price, same quality, same service” synergetic logistics service. Synergetic management system of agri-product logistics based on cloud service platform can be divided into three aspects: strategy layer, operation layer and support layer.

The highest level is the strategy layer which is the command center conduct the operation layer to enact efficient logistics solutions. It's mainly responsible for the overall plan, design of agri-product logistics cloud services, synergetic performance appraisal of cloud platform, standards of agri-product logistics cloud service and distribution of synergistic benefits and so on.

Command of strategy layer, the main duties of operation layer are managing suppliers of agri-product logistics service who must offer high-quality services including real-time monitoring and tracking, powerful transfer and feedback of information. Meanwhile, operation layer must also formulate uniform quality standards of services, operation criterion of logistics, control of financial risk, management of information safety and so on.

Support layer is composed of a variety of hardware resources and software technologies. Hardware resources include equipments tools and facilities for strategy layer and operation layer, which make suppliers and demanders to master processing status through visual surveillance systems in time. Software technologies include a variety of management techniques and Internet technologies. Management techniques are the methods or standards such as total quality management, on-time delivery, electronic automatic ordering system, customer relationship management, financial transactions, e-Government, standardization of business processes, standardization of logistics operation time and so on. Internet technologies are the ubiquitous network tech such as cloud computing, Internet of things, Big Data etc. As shown in Figure 3.

SYNERGETIC MECHANISMS

The target of agri-product logistics based on cloud service platform for its main body is to increase the synergetic return and their own earnings as well promote the competitive advantage. So they should strengthen synergetic degree and ensure self-organization mechanism, negotiation mechanism, trust mechanism, interest mechanism, punishing mechanism to work smoothly, stably and better. As shown in Figure 4.

Self-organization mechanism of agri-product logistics based on cloud service platform

Analysis of self-organization condition

First, openness is primary conditions of self-organization for system which can evolve from disorder to order. Agri-product logistics based on cloud service platform is a typical example of an open system. Its main body accesses a variety of resources and service to cloud platform, obtain information and resources from other enterprises in the platform to organize the related logistics activities. Besides that, its main body can know the logistics of agri-product in real time and adjust relevant capital, manpower, facilities, technology and other factors timely due to intelligent characteristics. Second, the system is far away from the equilibrium. That is "Non-equilibrium is the source of order". It's not only a necessary condition for the emergence of the ordered structure of the system, but further explanation to the open system. There are a lot of enterprises in the cloud platform such as suppliers, demanders and cloud servicers, these enterprises are located in different regions, have different sizes and support spotty quality and credit of service. In order to get more logistics orders in the platform, they compete fiercely. Thus it can be seen, cloud platform has non-equilibrium feature. If we make the competition of these enterprises in the cloud platform from disorder to order, they should play their own logistical advantages, innovate logistics services, set standards of agri-product logistics cloud service, accept supervision and regulation of Government.

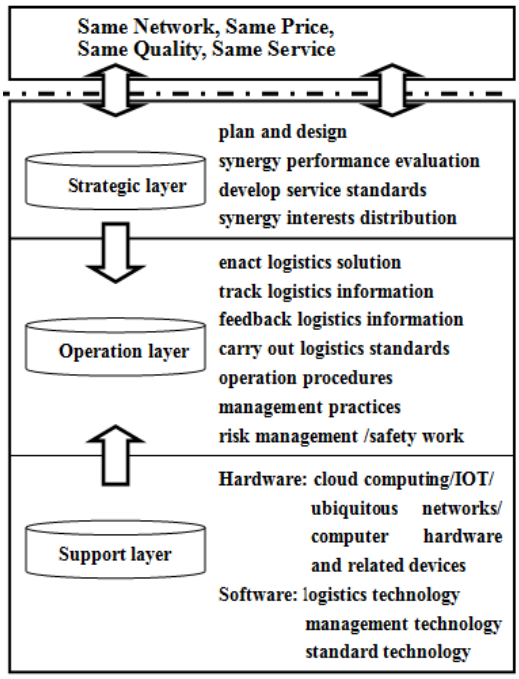

Figure 3 : Synergetic management system of agricultural products logistics cloud

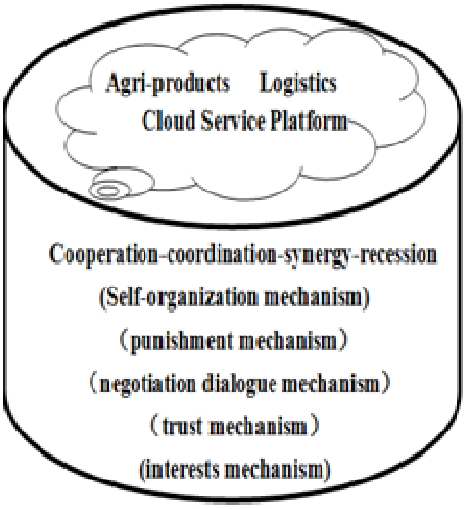

Figure 4 : Synergy management mechanism of agricultural products logistics cloud service platform

They compete fiercely. Thus it can be seen, cloud platform has non-equilibrium feature. If we make the competition of these enterprises in the cloud platform from disorder to order, they should play their own logistical advantages, innovate logistics services, set standards of agri-product logistics cloud service, accept supervision and regulation of Government.

Third, agri-product logistics cloud service platform is nonlinear interaction who design agri-product logistics distribution plan intelligently according to requirements of users. So it's not a simple linear superposition of resources, organization and information. Enterprises based on the information which can get real-time feedback from cloud platform, optimize the distribution route, increase or decrease the number of delivery personnel to achieve optimal synergetic distribution program.

From what has been discussed above, the agri-product logistics based on cloud service platform has the capacity of self-organization whose organization and management in accordance with the three basic conditions of the self-organization.

Self organization mechanism of agri-product logistics cloud service platform

If the enterprises want to complete a service of agri-product logistics through the cloud platform, they should make a detailed description of the relevant resources of agricultural logistics firstly. Managers of cloud platform evaluate the resources qualifications of agri-product logistics. If it meets the criteria of cloud platform, managers publish the information of agri-product logistics resources in the cloud platform for demanders of agri-product logistics to choose. After the transaction, they settle accounts directly. Finally, both parties credit would be assessed.

Order parameter governs the movement of subsystems, determines the macroscopic state of system and dominates the phase change of the system. Throughout the whole trading process in agri-product logistics cloud service platform, all transactions revolved around agri-logistics demand, if there is no demand, all cloud service is unable to run, so agri-logistics demand is the order parameter of the agri-product logistics cloud service platform.[6] Enterprises in the cloud platform try their best to meet the customers' individual need, change randomness of agri-logistics demand into relatively stable agri-logistics demand. Agri-product logistics cloud service specific self-organization evolution process which can be divided into four stages: cooperation -coordination- synergetic- recession.

The first stage is cooperation. Before entering the agri-product logistics cloud service platform, every enterprise of agri-product logistics is an independent economic entity and pursuing its own profit maximization. It cooperates with other enterprises in the platform rarely even do not know each other. When it enters to cloud service platform of agricultural logistics, it would not meet need of users by himself. So it must cooperate with every enterprise of agri-product logistics and pool superior resources from them to achieve the overall service efficiency of logistics which is greater than single logistics enterprise.

The second stage is coordination. When enterprises enter into cloud service platform of agri-product logistics, they would make full use of their own geographical advantage, match time advantage and work together base on trusting principle and win-win mechanism. In this process, every enterprise coordinates and competes mutually, hopes to do better and faster coordinated distribution tasks.

The third stage is synergetic. In this stage, enterprises in the cloud platform focus on optimal allocation of resources and rational use of resources during synergetic distribution. On the one hand, due to the use of the Internet of things, ubiquitous networks, enterprises can real-time track agri-product logistics information, adjust the related agri-product logistics activities flexibly, on the other hand, financial service information, E-government information and other value-added business information provide important external environment support for normal operation of agri-product logistics cloud service platform. So, in the synergetic stage, enterprises in the cloud platform should pay attention to synergetic management of these internal and external resources, make self-organization ability of agri-product logistics service platform to get a qualitative leap.

The fourth stage is the recession, when demand for agri-product logistics reduced in the agri-product logistics cloud service platform, synergetic capability of agri-product logistics cloud service platform is also gradually declining, when there is no agricultural logistics demand in the cloud platform, the cloud platform will not exist any more.

Self-organized mechanism of agri-product logistics cloud service platform reveals synergies and self-organization behavior among enterprises. Enterprises enter into cloud platform, under the action of the ordered structure system's internal force, enterprises through synergetic movement produce synergistic effect, which make the distribution capacity of enterprises in the cloud platform to be far greater than one logistics enterprise by himself.

Negotiation dialogue mechanism of agri-product logistics cloud service platform

Agri-product are perishable, easy going bust, seasonal, they have higher requirements for logistics, the purpose of construction of agri-product logistics cloud service platform is to achieve efficient, safety and fast delivery. Enterprises get the logistics information from the cloud platform, but these enterprises are in different zones, different size, perform different logistics standards, besides that, enterprises may be affected by uncertainty factors such as weather, road and traffic,which make enterprises unable to connect agri-product in time, agri-product cannot ultimately be delivered to destinations. So, it must build negotiation dialogue mechanism among enterprises in the cloud platform, make enterprises of synergetic distribution to identify logistics contract, make necessary logistics standards, especially identify logistics contract when different modes of transport are exchanged between different logistics enterprises. For example, agri-product are moved from the aircraft to cargo truck, how to transfer procedures, how to organize the workers handling, if agri-product with special temperature requirements, how much is the temperature set point. In order to solve a series of logistical details, enterprises in the cloud platform need to strengthen negotiation talk, increase understanding, complete synergetic distribution of agri-product successfully.

The key of negotiation dialogue mechanism of agri-product logistics cloud service platform is to produce principles and rules of agri-product synergetic distribution, enterprises in the platform should consensus on logistics standards, solve the problems of agri-product logistics distribution process.

Trust mechanism of agri-product logistics cloud service platform

In the context of cloud computing, enterprises in the cloud platform need to establish trust relationship closely, they may face uncertainty risk during the distribution process. The behavior of trust each other in the cloud platform is an important basis which enable the cloud platform to play the intelligent function, it is the catalyst for rapid development of agri-product logistics cloud service platform. Several specific measures can be taken as follows:

First of all, before enterprises enter into the agri-product logistics cloud service platform, managers of cloud platform must trust rating for enterprises firstly. Because there are many logistics enterprisees in the market, the basis of each agri-product logistics enterprise is different, only those who are eager to obtain agri-product logistics information from platform, improve intelligent operation level, increase main business income, they will put their major logistics resources into the cloud platform,they are impossible to withdraw from the cloud platform, Once they exit, they will not develop any more, such a partner is worthy of trust. Besides, managers must evaluate the logistics resources and qualifications of the enterprises, learn about his past transactions, assess the market reputation and so on.

Secondly, managers of cloud platform must strengthen the enterprises' dynamic trust evaluation in the cloud platform. When the enterprises participate in agri-product synergetic distribution, they showed high sincerity, integrate good logistics resources of their own, communicate actively with other partners in the platform, track real-time logistics information, feedback information on cloud platforms timely, maintain long-term relations with other partners, they won't quit cloud platform easily, they will not take opportunistic behavior. This kind of logistics enterprise is to be trusted, the manager of cloud platform can improve their trust rating, the enterprise who has higher trust level can get more logistics resources information from the cloud platform, and be more authoritative in the cloud platform. However, those who in the cloud platform do not act according to the contract, do not finish agri-product logistics task timely, manager of cloud platform may be lower its trust rating.

So, it is necessary to establish a regular, ongoing trust evaluation system, which can make dynamic integrated assessment of partners in the cloud platform, ensure that the agri-product logistics cloud service platform can operate normally and continuously.

Interests mechanism of agri-product logistics cloud service platform

Agri-product logistics cloud service platform as a low door abuses and high openness platform, it needs good interest mechanism to maintain cloud platform stable operation.[7] Managers of cloud platform coordinate and balance the interests of different stakeholders in the cloud platform, the specific interests mechanism as shown as follows: interest balancing mechanism, interest distribution mechanism and interest compensation mechanism.

Interests balancing mechanism

With the steady and rapid development of the agri-product logistics cloud service platform,it can increase enterprises' trading volume in the cloud platform. But if trading volume of enterprises in the cloud platform, there may be a few logistics enterprises appear the Matthew effect, inhibit development of other small and medium sized logistics enterprises, at last, the agri-product logistics cloud service platform collapse. It should be careful to avoid certain logistics enterprises to be overexpansion, add more functional logistics service suppliers, further make market segments, avoid the monopoly enterprise appearing in the cloud platform.

Interests distribution mechanism

When designing an interest distribution rules of enterprises in agri-product logistics cloud service platform, managers of cloud platform not only take into account each enterprise's investment costs, value-at-risk, efforts value, contribution value, but also take into account its past performance, trust and reputation factors. If one enterprise's integrated value is high, it can increase the weight of its benefit-sharing coefficients, long term thinking, it is conducive to promote good synergetic behavior among enterprises in the cloud platform.[8] In addition, agri-product logistics suppliers auction agricultural logistics products in the cloud platform, which attract agri-product logistics demanders bidding auctions.

Interest compensation mechanism

When credit and reputation of enterprises in the cloud platform is to be a higher level, they can get more logistics information, more technical information, more financial information, more policy information and more value-added service from the cloud platform, ask for more help from the cloud platform, it's another kind of interest compensation.

If interest mechanism is scientific and fair, it can ensure the normal and stable operation of agri-product logistics cloud platform, improve operational efficiency and performance of cloud platforms, improve enterprises' service quality.

Punishment mechanism of agri-product logistics cloud service platform

If enterprises publish false information in the agri-product logistics cloud platform, deceive other enterprises in cloud platform, or they can not complete orders timely even badly damage cargoes, managers of the cloud platform should punish these enterprises, reduce their credit rating or even expel them from the cloud platform, take legal action to prevent fraud. Otherwise, before signing each order, enterprises should predict fraud, establish detailed contract, make detailed penalties and measures to avoid losses.

In a word, the synergetic management system of agri-product logistics cloud service platform, self-organization mechanism is motivation of development of cloud platform, negotiation dialogue mechanism is the basis of communication among enterprises in the cloud platform, trust mechanism is cultural soul of cloud platform, interests mechanism is important safeguards of cloud platform, punishment mechanism is important measure of long operations of cloud platform. Only enterprises in the cloud platform cooperate as a whole, they can improve agri-product logistics cloud platforms operational efficiency and get greater profit.

CONCLUSION

At present, the related businesses in China start to use cloud computing to promote service of agri-product logistics. The distinctive features of cloud service for agri-product logistics include integrating for organization, information and resource. The management of agri-product logistics cloud services must highlight agile synergetic, networked and intelligent synergetic requirements. With the help of cloud service platform for the agri-product logistics, enterprises in the cloud platform integrate all kinds of advanced resources of agri-product logistics, share resources, have complementary advantages, reduce operating costs and create more value. Synergetic management of cloud services platform for agri-product logistics is the better way to speed up services of agri-product logistics.

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REFERENCES

[1] Sun Hongling, Liu Yaxin; Fresh Agri-product Supply Chain's Optimization and Upgrading with the Support of Cloud Logistics. Prices Monthly, **7**, 1-20 **(2013)**.

[2] Zheng Huilong, Liang Zhichun; Development of a Logistics System for Agriculture Products by Cloud Computing Technologies. Modern Food Science and Technology, **12**, 1839-1843,1778 **(2012)**.

[3] L.Chen, Y.Hu, F.Zhang, et al; Performance improving design on cloud computing for agri-product safety traceability system. Transactions of the Chinese Society of Agricultural Engineering, **29(24)**, 268-274 **(2013)**.

[4] J.J.Song; The Characteristic of Agri-product Logistics. Southwest University. China.**(2006)**.

[5] Xia Jinwen, H.Shu; The Evolution of Logistics System Analysis of Synergetic. Business Research. **12**, 190-192 **(2009)**.

[6] X.Shen; Supply Chain Strategy Synergetic Mechanism Based on Self-organization. Journal of Systems Science. **11**, 42-46 **(2011)**.

[7] X.Wang; Research on the Benefit Distribution of Logistics Service. Wuhan University Of Technology, Wuhan, China, **(2013)**.

[8] F.Yan; Research on the Collaboration Mechanism of Logistics Service Supply Chain. Chang' an University, Xi' an, China. **(2009)**.