Research on the Construction of Agricultural Product Virtual Logistics Enterprise

Fan Liu

Abstract With the development that the demand for agricultural products consumer market is gradually toward to the direction of complication, the existing agricultural logistics organizational model can't adapt to the characteristics of agricultural product logistics and the changes in consumer demand. Based on the analysis of virtual operation trend of agricultural product logistics enterprise, this paper explicits the concept and characteristics of agricultural product virtual logistics enterprise and proposes four steps to build an agricultural product virtual logistics enterprise, including the analysis of key elements about agricultural product virtual logistics enterprises, the needs identification about agricultural product logistics business, the project decomposition of agricultural product virtual logistics enterprise and the partner selection in agricultural product virtual logistics enterprise.

Keywords Virtual operation · Agricultural product · Virtual logistics enterprise construction

The paper is funded by Hubei Province Soft Science Project (2014BDH116), 2015 Hubei Province Education Department of Humanities and social science Project (15G021), China Logistics Association and the Ministry of education teaching Commission Project (2015CSLKT3-069, JZW2015072) and WTO and development of Hubei research center Project (W2015005).

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X. Li and X. Xu (eds.), *Proceedings of the Third International Forum on Decision Sciences*, Uncertainty and Operations Research,
DOI 10.1007/978-981-10-0209-0_2

1 Introduction

The organization mode of virtual operation with its advantage of agility of production, information sharing and risk sharing can enhance the competitiveness of enterprises and improve value-added ability of the supply chain in a relatively short time. However, the organization mode theory of virtual operation is still in its infancy in the application and practice of logistics at home and abroad and there is seldom research on virtual operation of agricultural product logistics enterprises. The scholars' research at home and abroad shows that the organization mode of virtual operation applied to logistics field is one dynamic alliance of supply chain integration mode which takes the logistics market opportunities as the driving force [1], obtaining the scale benefits in logistics field as a link, the advanced computer information network technology as the support and process optimization as the purpose [2], in this alliance, each partner contributes their own core competence at the stage of transport, storage, packaging, distribution and other stage and continues to share information in the supply chain in order to achieve the optimal allocation of logistics resources between enterprises and provide logistics service with low cost and high quality for the customers. Applying the organization mode of virtual operation to agricultural product logistics is the development direction for modern agricultural product logistics enterprises to cope with the increasingly complex personalized customer requirements and ensure the overall operational efficiency of the logistics system [3]. Based on the above background, this paper intends to discuss the problems about agricultural product logistics enterprises both from theoretical and practical aspects and explicit the concept and characteristics of agricultural product virtual logistics enterprises based on analyzing the virtual operation trend of the agricultural product logistics enterprises and then put forward the steps of constructing the agricultural product virtual logistics enterprises [4].

2 The Virtual Operation Trend of the Agricultural Product Logistics Enterprises

The division of labor and specialization of logistics aspects have become important means to improve the efficiency of agricultural product logistics because of the particularity of agricultural product itself, which also brings separation and imbalanced development between different enterprises and members of the department [5]. But the integrity of the agricultural product logistics process promotes each part isolated to fusion, one important issue that logistics organization faces is that how to effectively manage the whole process of agricultural product logistics, the development of information technology provides the possibility to solve this problem and at the same time provides the means for the integration of agricultural product logistics organization [6]. Based on the aforementioned status of agricultural logistics as shown in Fig. 1, integrating the agricultural product

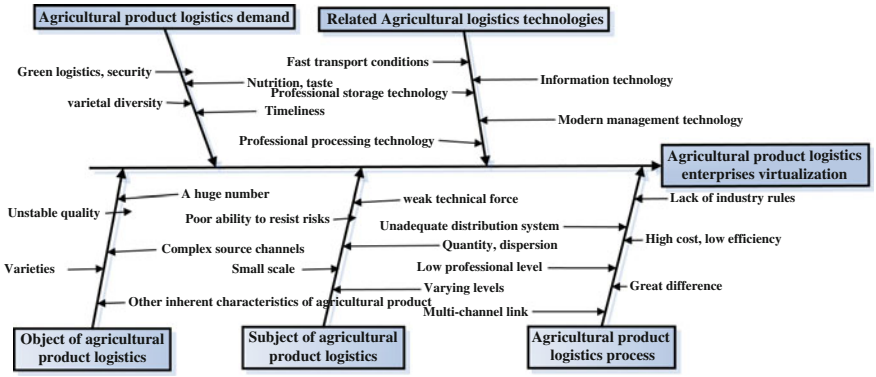


Fig. 1 Virtual trends of agricultural product logistics enterprises

logistics enterprises has become the inevitable trend considering the characteristics of logistics subjects, logistics organizations, logistics modes, logistics aspects and technology. The agricultural product virtual logistics enterprises under virtual operation with its competitiveness of organization, system and the advantage of integration and good ability to adapt to the market provide an effective organizational mode for agricultural product logistics in China.

3 The Construction Steps of Agricultural Product Virtual Logistics Enterprise

According to the concept and characteristics of agricultural product virtual logistics enterprise, its construction includes the following four steps: the analysis of key elements about agricultural product virtual logistics enterprises, the needs identification about agricultural products logistics business, the project decomposition of agricultural product virtual logistics enterprise and the partner selection in agricultural product virtual logistics enterprise.

3.1 The Analysis of Key Elements About Agricultural Product Virtual Logistics Enterprises

The primary participants of agricultural product logistics involve the supply side, the demand side and the third-party logistics enterprises. The agricultural product virtual logistics enterprises also depend on the three factors. Besides, in order to have a fast response to market by integrating external resources in a short time, they

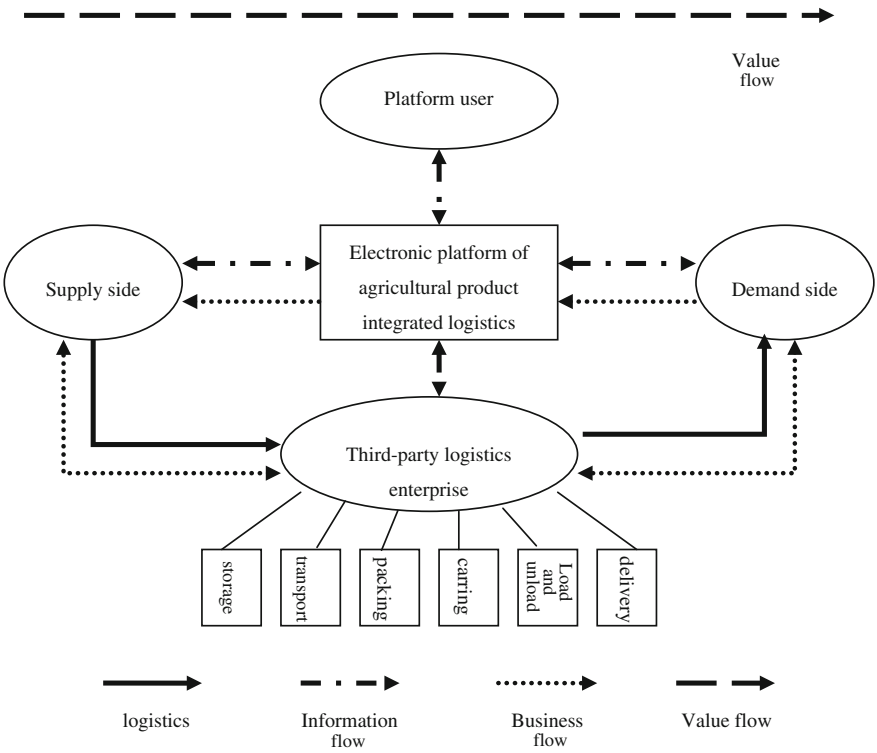


Fig. 2 The producing and flow of the value in the agricultural product virtual logistics enterprises

need to build a common information platform and infrastructures by using Internet information technology, modern logistics technology and management technology. Figure 2 expresses the producing and flowing process of the physical flow, the business flow, the information flow and the value flow in the agricultural product virtual logistics enterprises: the supply side is the beginning of the circulation of the agricultural product, the third-party logistics enterprise is the undertaker of the circulation who will send the agricultural products which satisfy the needs to the final customers [7].

Based on the above analysis, it shows that agricultural product virtual logistics enterprises need the following key factors to operate efficiently.

1. **Efficient information system and information transmission system**
   Agricultural product virtual logistics enterprise is a dynamic cooperation pattern based on logistics information Internet platform. In the situation where the range of choices of enterprise members is large, it needs a common reference standard to accomplish the process of the handing of orders, the flow of information and the upgrading of information technology, in which way instant response and

instantaneous cooperation will be achieved better. By means of high network information platform, the producing information of agricultural products and the information of logistics operation during every period can fully flow and be used; the whole process of the producing ad consuming and flowing of the agricultural products can be visible; the transaction costs of every section can be reduced; the quality loss of the agricultural products can be less; the service level of logistics can be improved and finally, every participant in the supply chain of agricultural products can get biggest benefits.

2. **High-level standardization**
   In order to guarantee the smooth logistics process of the agricultural products, it needs common standards, which include products classifications and codes, logistics terms, measurement dates and logistics services to regulate every participant's operation. Standardization is an important process to guarantee the agricultural products' quality. The standardization covers the whole process and scale of the supply chain of agricultural products which includes not only the process of the producing, harvesting, sorting, packing and quality testing, but also the process of handing, storing, transforming, loading, unloading and distributing. And the standardization covers not only the logistics devices and the logistics methods, but also the logistics technology.
3. **Developed logistics technology**
   Because agricultural products are perishable, the moisture content is high and the shelf life is short, the requirements of the transformation scale and operating time of the agricultural products are high. In order to satisfy those requirements, the logistics technologies of every section need to achieve matching levels. Accordingly, improving the level of the agricultural product logistics technology is the efficient and direct method to improve the service level of the agricultural product virtual logistics enterprises.
4. **Excellent cooperation and trust mechanism**
   The formation of the agricultural product virtual logistics enterprises is based on the temporary market chances and has high requirements for the flow ability and transparency of information. Therefore, the trust and cooperation between virtual logistics enterprises participants is the foundation of creating value and sharing benefits [8]. And excellent trust and cooperation system is not only the trust to the ability of the partners but also the level of sharing the demand and supply information and knowledge of agricultural products and logistics service between partners. With the help of the secure trust and cooperation system, every enterprise participants can communicate and exchange messages and can get changes in demand of the agricultural product logistics market. And the logistics service circle of agricultural products will be cut in a larger scale, the logistics service costs will be lower and the integral logistics operation efficiency will become higher.

3.2 The Demand Identification of Agricultural Products' Logistics Business

By means of agricultural product virtual logistics enterprise information platform, agricultural product logistics enterprises can find the demands of logistics business and seize the marker opportunities. Recognizing the market opportunity is the beginning and key of forming agricultural product virtual logistics enterprises. After the core agricultural product logistics enterprises finding and recognizing the business demands in the market, the opportunity is need to be analyzed and accessed. The opportunity feasibility needs to be strictly evaluated and then the core ability needs to be achieves and the opportunity needs to be confirmed. Finally, the most valuable opportunity is found. When the enterprises find they do not have complete grasp and ability to implement the market opportunity, in other words, they can only provide part of the main resource such as one or several functions of transportation, storage, distribution processing, handling and delivery to accomplish the opportunity, they need to adopt the mode of virtual enterprise and actively construct agricultural product virtual logistics enterprises. In this process, he enterprise who launches first must have the perfect, market information system, sensitive sense of opportunity recognition ability and scientific management methods of enterprises, then they can launch and organize the agricultural product virtual logistics enterprise.

3.3 Project Breakdown of Agricultural Product Virtual Logistics Enterprise

Depending on the resource-constrained situation, we can divide logistics enterprise project into two cases that are no consideration and consideration of resource constraints. The former refers to the adequacy of logistics recourse or small amount of materials needed to be processed during the operation of the agricultural logistics system [9]. Time-cost constraint need to be considered only. The latter refers to the shortage of logistics recourse or large amount of materials, such as the sharp rise in demand for agricultural products around the Spring Festival and transportation forces are relatively tight, and then we should give full consideration to the capacity-cost constraint and work together to complete the entire virtual agricultural logistics enterprise projects while ensuring profitability [10].

The breakdown of virtual logistics enterprise projects which base on time-cost constraint and capacity-cost can take the method of systems engineering, and define an agricultural virtual logistics network first, then establish agricultural virtual logistics network model which can be transferred into corresponding network optimization problem, through further solving and feasibility analysis breakdown of the entire agricultural virtual logistics enterprise project can be completed.

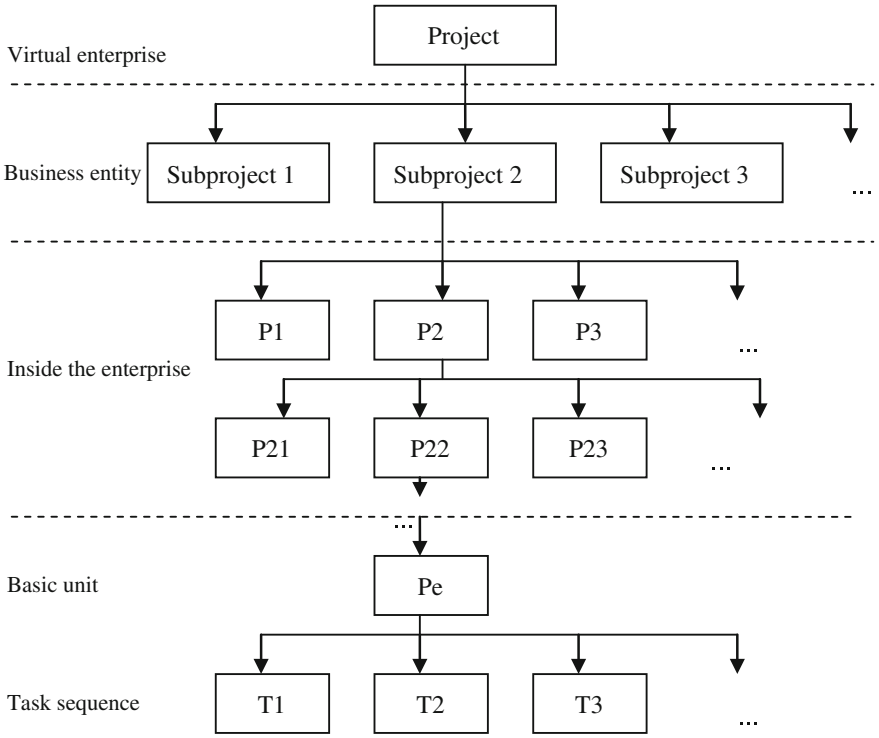


Fig. 3 Agricultural product virtual logistics enterprise project breakdown process

The project breakdown process of agricultural product virtual logistics enterprise shows in Fig. 3.

3.4 The Partner Selection of Agricultural Product Virtual Logistics Enterprise

The competitive advantages of agricultural product virtual logistics enterprises come from the complementary resources and core competencies between them. How to select partners properly is the key to success. Different from traditional agricultural logistics partnership, virtual agricultural logistics partnership is not only transaction, but also need to be consistent in the targets of reducing inventory levels and overall logistics costs, enhancing information sharing, improving the overall competitiveness. We can analytic hierarchy process for agricultural virtual logistics enterprise partnership screening. The steps are:

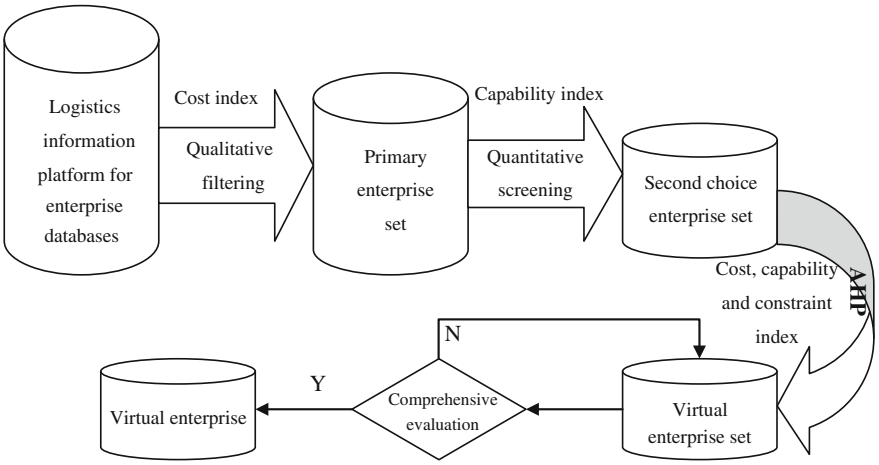


Fig. 4 Virtual agricultural enterprise partner selection process

1. Establish evaluation index system
   Based on the comprehensive study of existing literature, combined with the characteristics of agricultural product logistics, the key evaluation index of enterprise partner can be divided into three categories: the cost index, the capability index and constrained Index.
2. Virtual enterprise partner selection process
   Through the logistics information platform, initiated enterprise obtains network modules about transportation, warehousing, distribution processing, handing, distribution and other logistics functions. To construct virtual agricultural logistics enterprise, enterprise needs to select appropriate partner to join in from these network modules [11]. This selection process is divided into three stages: qualitative filtering, quantitative screening and analytic hierarchy process. Qualitative filtering reduce the number of selectable firms to a certain range through cost index; in quantitative screening stage enterprise will be further concentrated according to capacity-type index. Finally in the stage of analytic hierarchy, the most suitable enterprise can be selected to join in the virtual enterprise. As shown in Fig. 4.
   In the analytic hierarchy stage, we build a hierarchical model and the overall goal is divided into multiple targets or criteria, and then divided into some level of the criteria, standard or constraint. As shown in Fig. 5.
   After these AHP methods, the outstanding industries for every functional module have already been selected so that a virtual partners set generated. Next, we need to evaluate and optimize these partners comprehensively, take the measures of multi-objective programming, genetic algorithms and so on. To judge whether these enterprises meet the needs of the overall quality of the virtual enterprise. Finally, the best combination of Virtual agricultural Logistics enterprise can be finalized.

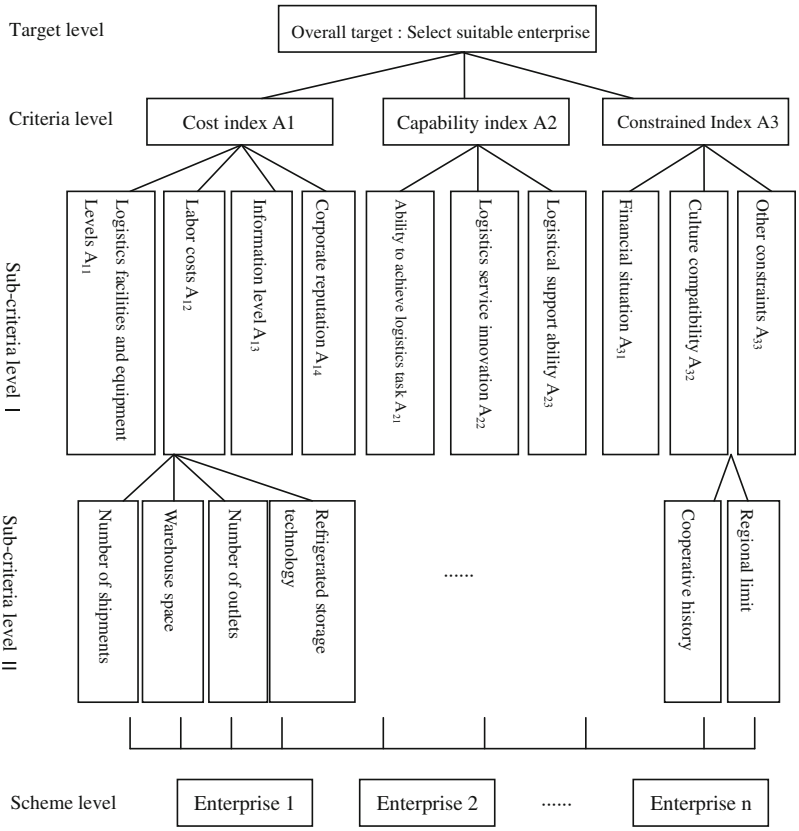


Fig. 5 Virtual agricultural logistics enterprise analytic hierarchy structure model

4 Conclusion

In the process of constructing the agricultural product virtual logistics enterprise, they must also do the following work:

1. The coordination and security of information sharing. The agricultural product virtual logistics enterprise shall put forward the coordinated security measures to ensure the successful implementation of information sharing mechanisms such as the establishment of goal management mechanism, group consultation system and incentive constraints contract;
2. The distribution of interests among the member enterprises. They should follow a win-win principle, the matching principle of risk and investment and decision-making satisfaction principle in the distribution of benefits.
3. The establishment of risk control mechanism. It is very necessary to establish the risk control mechanism for the successful operation of the agricultural

product virtual logistics enterprise. The enterprise can use information entropy risk analysis algorithm to evaluate the risk factors when having established the risk identification system for agricultural product virtual logistics enterprises, and then select the key observation factors of risk control to take the risk prevention and control measures.

4. The construction of the internal trust evaluation system. The review and assessment for the member enterprises should fully take their wishes of history, reputation, business ability, the credit grade, resource endowment, interdependence, their appetite for risk and cooperative characteristics into account. The evaluation of credit rating can be determined through the third party organization, those enterprises whose credit rating is low should not been considered.

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http://www.springer.com/978-981-10-0208-3

Proceedings of the Third International Forum on Decision Sciences

Li, X.; Xu, X. (Eds.)

2016, VII, 75 p. 40 illus., 27 illus. in color., Hardcover
ISBN: 978-981-10-0208-3