

# Research on Agricultural and Sideline Products Logistics Capability Maturity Model

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**Abstract**—Through study it helps companies that they can adjust their strategies according to the maturity of the logistics market. The essay takes the agricultural and sideline products logistics capability as the object of study, makes issue analysis from the angles of supply chain, the structure, and then do a review from producers, consumers, middlemen and other aspects, while making logical reasoning and empirical analysis for the measurement index of the logistics capability of agricultural and sideline products. Through research, it puts forward ALCMM for the first time and hierarchically describes key logistics activities under each grade. This study can provide some reference for the logistics capability analysis and positioning of enterprises themselves, to form a logistics capability system with core competitive advantages. ALCMM can scientifically and effectively improve logistics capabilities, the article started from the maturity concept of software enterprise competence, combined with the actual operational situation of Chinese logistics services, first put forward ALCMM and hierarchically described the key logistics activities under each grade, can provide a reference for analysis and positioning of logistics capabilities of the enterprises themselves.

**Keywords**-Agricultural and sideline products; Logistics capabilities; Supply chain; Quality; Maturity model

## I. OVERVIEW OF LOGISTICS OF AGRICULTURAL AND SIDELINE PRODUCTS

Logistics of agricultural and sideline products refers to a physical economic activity which meets customer needs and realizes the value of agricultural and sideline products, thus transfer the material entities and related information of agricultural and sideline products from the producers to the consumers. Specifically, it includes the production, purchase, transportation, storage, handling, transport, packaging, distribution, circulation, distribution processing, distribution, information activities and other series of links of agricultural and sideline products, and increases the value of agricultural and sideline products in this series of links.

## II. LOGISTICS CAPABILITY ANALYSIS OF AGRICULTURAL AND SIDELINE PRODUCTS

### A. Existing issues of logistics of agricultural and sideline products at present

#### 1) Issues of the supply chain

##### a) Issues of the producers

From the objective point of view, the quality of producers themselves of agricultural and sideline products is relatively low, and the distribution is more dispersed, lacking of a strong bargaining power, they are often excluded from the logistics chain so that they cannot fully master all of the information in the circulation of agricultural and sideline products, and are more impossible to arrange production according to the information of the actual situation, so they can only listen to arrangements of middlemen or dealers, thus harming their legitimate rights and interests.

##### b) Issues of the connection of supply chains

The hardware facilities of current domestic logistics companies generally lag behind, the major performances of which are in:

- ① Behindhand storage and handling technology;
- ② Behindhand testing facilities;
- ③ Behindhand transport infrastructure.

The major performances of lack of e-commerce, low degree in information technology are in: ① Inadequate logistics information network, small cover area. According to the survey, among Chinese logistics service companies, only 40% of companies have logistics information systems, the vast majority of logistics services companies are still in the stage which they do not have the ability to use modern information technology for logistics information processing. Therefore, there are issues abound by fours and fives that the information is not comprehensive, the information lacks of accuracy, timeliness and other aspects; ② Poor circulation of information between the main parts of the supply chain.

##### c) Issues of retail terminals

The retail terminal of our agricultural and sideline products are mainly farmer's markets, catering services and supermarket chains. Current farmer's markets are small-scale and the operations are not standardized, both hardware facility and degree of information are very low, therefore they cannot provide accurate feedback of marketing information, we cannot provide security

guarantees for the consumers in supply chain. Therefore, even if the price of agricultural and sideline products in the supermarket chain is relatively high, but for their own safety, gradually people begin to tend more to the consumption in supermarket chain where after-sales service and other aspects are guaranteed. So the gradual exit of farmer's market from the supply chain of agricultural and sideline products is the trend of development.

## 2) Structural issues

### a) Unreasonable network topology

The channels for commodity circulation of most agricultural and sideline products in China are cockamamie, so quite a portion of agricultural and sideline products causes huge losses due to the time, transport capacity, traffic conditions and product freshness technical reasons. The unreason of logistics network layout results that agricultural and sideline products will invite a lot of unnecessary links in the intermediate links, so that it not only makes the logistics costs increase and profits decrease, but also makes the green agricultural and sideline products increase the loss in the supply chain and in the logistics way.

### b) Unreasonable investment structure

The related organizations of Chinese logistics attach great importance to inputs in the production and sales of agricultural and sideline products, but the agricultural and sideline products which need to be refrigerated and preserved are obviously insufficient in inputs in terms of transportation, processing and other obvious deficiencies. At present, China's cold chain logistics of agricultural and sideline products is still in its infancy, only 30% of the agricultural and sideline products have entered the cold chain logistics system.

### c) Lack of proper regulation system

Currently, the regulation efficiency on logistics of agricultural and sideline products is not high. Main causes are the unclear responsibility, division of labor is unknown, reflecting the larger conflicts of interest; and main market players are not mature, and extremely difficult to implement the new control methods; and information service of agricultural and sideline products by relevant departments is not timely, basically is dispensable.

## B. The impact brought by logistics development of agricultural and sideline products

### 1) Impact on the producers of the product

Cargo included in the entire logistics agricultural and sideline products are provided by farmers, so the farmers are located at the forefront of the entire chain, are the largest beneficiaries in the chain. Once the appreciation phenomenon appears in the logistics of agricultural and sideline products, the first beneficiaries are the farmers, in this way it can effectively promote their income.

### 2) Impact on consumers

When logistics of agricultural and sideline products gets a good development, the second beneficiary of it is the purchaser. The impact of the development of logistics capability on agricultural and sideline products themselves mainly reflects in: Improvement of product quality, increase of product delivery efficiency, the reduction of product cost and other impacts. Agricultural and sideline products are indispensable for each consumer's life, so once logistics capability of

agricultural and sideline products has been improved, the overall quality of the products will be enhanced, the standard of living of consumers will be significantly increased.

### 3) Impact on middlemen

The logistics of agricultural and sideline products is difficult, so it is necessary to take certain measures to guarantee that the product in accordance with the quality requirement to successfully flow into the market places. This determines the logistics of the agricultural and sideline products must have the appropriate organizational measures in terms of infrastructure, transport machine, storage conditions, technical means. The logistics capabilities of the agricultural and sideline products and these are closely related. When logistics capabilities need to be improved, it is inevitable to promote the development of appropriate facilities.

### 4) Impact on the society and economy

As an important component of the market economy, agricultural and sideline products are essential for people's living, not only affecting the entire market but also closely relating to people's living. The species designed in the logistics of agricultural and sideline products, are related with the richness of the material on the market, at the same time the quality of agricultural and sideline products has a relatively great impact on the quality of the substance in the market. The sectors and technologies, which are related to appreciation of agricultural and sideline products, has a role in promoting the market construction and development.

## III. AGRICULTURAL AND SIDELINE PRODUCTS LOGISTICS CAPABILITY MATURITY MODEL

### A. The Logistics Capability Maturity Model of Agricultural and Sideline Products

The Capability Maturity Model (Capability Maturity Model, CMM), Logistics Capability Maturity Model<sup>①</sup> (LCMM), two ideas and models, according to the research, the article gets the actual situation of the logistics of agricultural and sideline products, and puts forward the capability maturity model of agricultural and sideline products (Agricultural and sideline products Logistics Capability Maturity Model, ALCMM).

### B. Maturity framework of agricultural and sideline products logistics capability

ALCMM is based on a measurement index of agricultural and sideline products logistics capabilities: pre-sale service, after-sale service, operational speed, reliability, the response speed of the target market, the informationization degree of operation, order processing speed, operating costs, security systems detection, etc., which divide the maturity of agricultural logistics enterprises into five grades.

(1) Level 1: Initial level, the enterprises have essentially no sound software engineering management system, product logistics fully depends entirely on the company's current staffing, so the agricultural and sideline products logistics processes at this stage are unpredictable, if the personnel changes, the processes change along with them.

(2) Level 2: Basic level, the enterprises have formulated a project management behavior of primary agricultural and sideline products logistics software.

This level of enterprises have taken certain measures, such as tracking the progress of logistics and cost.

(3)Level 3: Repeatable level, which has developed a basic project management process to plan and track targets. And also established the basic information platform, so that it can carry out basic information exchange activities with customers.

(4)Level 4: Quantitative management level, establish a special database, and collect various operating parameters of data during the process of logistics services of agricultural and sideline products, after sorting and analysis, logistics services process can be quantitatively understood and controlled.

(5)Level 5: The optimization level, keep data in the database constantly updating, research new technologies, continuously optimized management ideas and methods. The main work in this stage is to carry out process improvement continuously, especially on some weak links.

### C. The key processes in ALCMM

In order to improve logistics service capabilities of logistics service enterprise of agricultural and sideline products, to make them reach a certain specified level, the implement of key process is very important. In this paper, each level of ALCMM (except one level) is decomposed into three levels, which will be defined separately.

The first level is according to the ability of target customers themselves, to clear and definite their own goals through the analysis, and to determine the areas which need significant improvements of target customers; the second level is the planning work for the planning area which needs significant improvement, including the responsibilities of relevant personnel and roughly steps, goals, etc. of the implementation ; the third level is the ultimate detailed work plan of the improvement work.

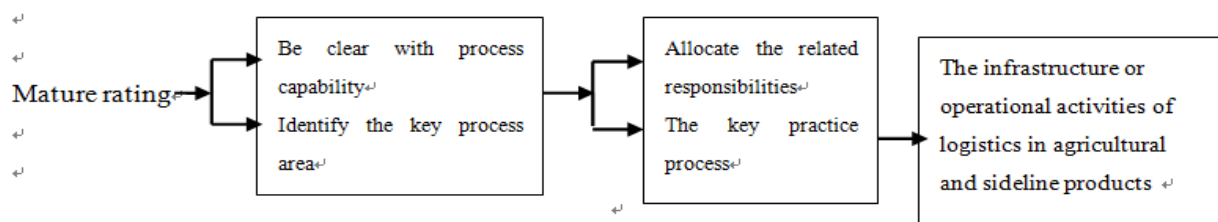


Figure 1 Key processes

The key process of SALCMM is that the enterprises need to achieve the settlement of issues in appropriate

level of maturity, the issues which must be solved in all levels are in the following “Fig .2”:

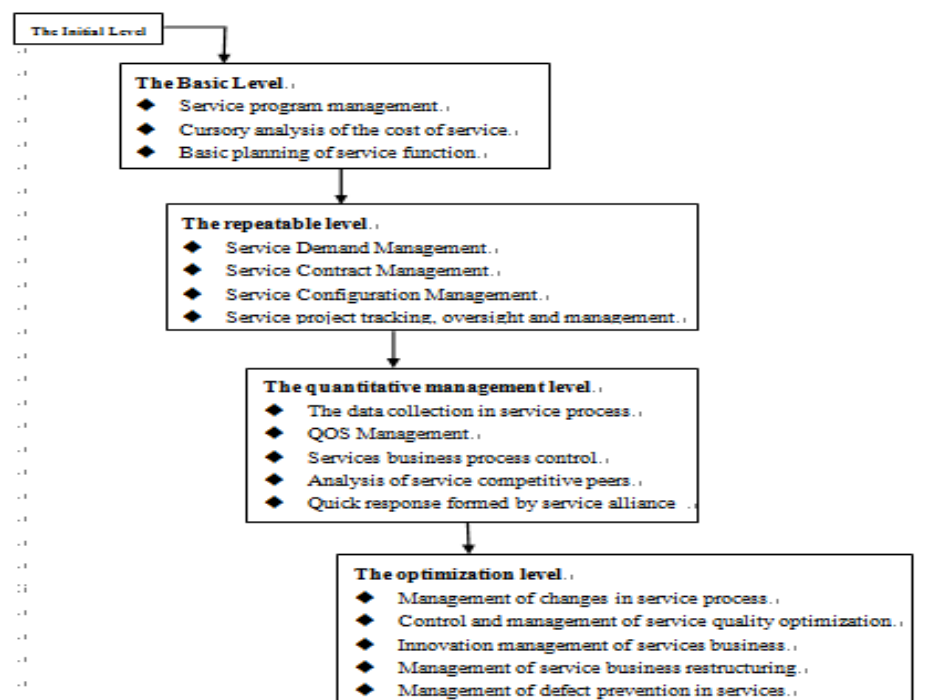


Figure 2: The issues needed for solution in key processes

#### IV. APPLICATION IN ALCMM

##### A. Instance Analysis

A certain agricultural and sideline products logistics company in Shandong Province is taken as an example. The first-stage project of this company is completed in 2009, through scientific and rational perspective layout planning, adopting versatile hybrid interactive modes in trading, storage, distribution, commerce, inhabitancy, office and leisure, realizing multi-format accumulation effect, designed to provide our clients a large-scale, high grade, powerful functional, broad scope platforms. The company is headquartered in Shouguang City, Shandong Province, the park occupies a total area of 3,000 mu, with a total investment of 2 billion Yuan, achieving the annual trading volume of 10 billion kilograms of agricultural and sideline products. The analysis of the company's current scale of operations is:

(1) The project is located north of Wensheng Street, Shouguang City, west of Caidu Road, which is located in the heartland of transportation of vegetables from South China to North China, the transportation is very convenient.

(2) The vehicle is rich in resources, including vans, long trucks, refrigerated trucks and other types of vehicles. Different vehicles are provided according to product features and transportation requirements of customers, and all vehicles in cooperation with the company have signed a strict co-operative contract and a transport union project.

(3) The company's six trading floors are equipped with LED screens, the screens timely display a variety of authoritative information released from market. All transactions of merchants in trading zone are settled by a card.

(4) The company as a project engineering of industry consolidation of the government, and government organization and development of the project, ensures the operating prospect of the project. Coupled with the company's own highly efficient, rational, scientific planning, the company is sure to become the starting point of benefiting all parties in vegetable industry, achieving the win-win of the overall business.

(5) Systematic and comprehensive quality management methods and means. The company stresses the effect on the company's growth by quality of service in logistics operations, establishes a series of quality assurance systems of logistics service.

① Overall quality objectives. In order to achieve the client's pursuit as its mission, set the forward-thinking, teamwork, network advantages as a whole, with safe, efficient, high quality, efficient logistics services, it ranks the first in the eastern part of the logistics industry. The specific objectives of quality management are as the following table 1:

② Quality assurance system Refer to ISO 9000 series of international quality certification standards, establish the company's quality assurance system, and to ensure continued and effective operation and continuous improvement, perfection and enhancement of the quality system.

Based on the above analysis, combined with framework analysis of logistics capability and maturity of agricultural and sideline products:

TABLE IV : QUALITY MANAGEMENT SPECIFIC OBJECTIVES

Items	Serial Number	Specific Contents	Target Value /%
Warehousing	1	Accounts, objects, and cards are corresponding, standards, standard rate	100
	2	The accuracy rate of timely delivery of report forms	100
	3	The rate of reaching the standard in laytime	≥98
Long-distance transport	4	The punctual rate of car source provided	≥95
	5	The punctual arrival rate of cargos	≥95
	6	The sign-off rate of the arrival of cargos	100
	7	The loss and damage rate of cargos	≤0.01
City distribution	8	The timely and accurate rate of delivery of receipts and report forms	≥95
	9	The rate of reaching the standard in delivery time	100
The overall target	10	The loss and damage rate in delivery time	0
	11	The capacity of the quality system assurance	≥85
	12	The number of times of quality accidents	0

(1) The company's logistics network is relatively sound, the vehicles resource is rich, indicating that the company has a certain share in the market.

(2) The company realized the information management of the comprehensive integration of logistics, capital flow, information flow, showing that the company has established the basic information platform, and it can carry out basic information exchange activities with customers.

(3) The company has systematic and comprehensive quality management methods and means, indicating that the company has formulated a basic project management, and it carries out tracking and monitoring for projects.

The above three points can indicate that the company is now in the third level of logistics capability maturity of agricultural and sideline products, and already have the conditions to enter the fourth level.

##### B. Formulate maturity framework of logistics

###### capability of agricultural and sideline products

According to key processes of logistics capability maturity model of agricultural and sideline products, the article formulates a preliminary plan to company's upgrade. Steps:

The first step: Be clear and definite that the level is the fourth level; The second step: Identify that the key process region is to establish a database; The third step: Assign staff responsibilities and objectives; The fourth

step: Set the most detailed work plan based on properties of agricultural and sideline products. The third step in this key process is the key point, according to the requirements of the fourth level of maturity model of agricultural and sideline products, the article formulates the responsibilities and objectives of the third step in the key process.

The personnel is divided into: Data collection personnel, quality management personnel, business process monitoring personnel, market competition analysis, marketing alliance establishment personnel. Their specific responsibilities and objectives are in the following:

(1) Data collection staff. Because the key area of this upgrade is the establishment of a database, so the duties of the personnel are the most. The staff needs to collect important data during every operation process, which is specifically divided into: ① Operation speed (Efficiency of loading and unloading of vehicles, transportation efficiency of vehicles, product packaging speed, etc.); ② Order processing speed (pre-service convey speed, response and reply speed of orders, time of deliver from godown and order generation time difference, etc.); ③ Operating costs (vehicle maintenance costs, transportation costs, handling machine maintenance costs, packaging costs, other costs); ④ Market response (Demands of vehicle type, demands of product type). Among which, ③④ are in reclassification by territory. ⑤ Product data (the best refreshing time, the longest shelf life, the best space, the best temperature)

(2) Responsibilities of quality management personnel and monitoring personnel have crossed parts, they mainly detect agricultural and sideline products to protect the security and quality of products, to monitor the model change in the process from the packaging to the consumers' hand.

(3) Responsibilities established by market competitive analysis and marketing alliances also have crossed parts. Their main job is to analyze the peers so that they form a famous brand, which has core competitiveness to increase market share. At the same time they can also form a strategic alliance with some companies to rapidly develop their own advantages, the weaknesses can be outsourced, so they can improve capital effective rate.

### C. Analysis of deficiencies in the application of logistics capability maturity model of agricultural and sideline products

To analyze the following deficiencies using the actual operation situation of the company combined with ALCMM:

(1) Because in the logistics operation process, the company's business focuses on transport and warehousing, is difficult to provide solutions to integrated logistics services. When companies want to integrate dispersed businesses, there will be a lot of prospective unpredictable issues occurred during the specific implementation process. Solving these issues needs accumulation of experience. At present, the history of Chinese logistics industry is very short, such experience is very little, so the experience which companies can use for reference is very little, which mainly relies on the judgment of professional logistics personnel, thus increasing the risk, there will certainly be a lot of money invested in the earlier stage, the integration stage.

(2) Lack of innovation management. Innovation Management's strategy is concluded which needs analysis through years of experience by professionals, and cannot only rely solely on the data, the data is only a surface phenomenon, the deeper significance still needs depth profiling by professionals, so there is still a factor existing in personnel deviation.

(3) Lack of control and management of logistics services process. When products are in controlled regions of enterprises, they can be completely monitored, but when the products are shipped to uncontrollable regions, companies will lose the ability to fully monitor, this is the current issue of Chinese total logistics system, which is the factor of force majeure.

(4) The prevention management and process change management of logistics service defects are still not perfect. The predictability of situation that may occur in the future is not perfect, because the accumulation of data is not enough, which needs time.

### V. Conclusion

Maturity of logistics development of agricultural and sideline products is closely associated with the people's quality of daily life. It must be industry which needs rapid development. ALCMM can scientifically and effectively improve logistics capabilities, the article started from the maturity concept of software enterprise competence, combined with the actual operational situation of Chinese logistics services, first put forward ALCMM and hierarchically described the key logistics activities under each grade, can provide a reference for analysis and positioning of logistics capabilities of the enterprises themselves, and then find out the gap between the development processes, forming a logistics ability system with core competitive advantages.

### NOTES

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