

# Research on Decision Optimization in Enterprise Supply Chain Management: A Case Study of Tea Industry

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**Keywords:** Supply Chain Management, Decision Optimization, Tea Industry, Value Increment.

**Abstract:** With the gradual improvement of supply chain system and the continuous strengthening of supply chain management, increasing enterprises have invested more energy in the supply chain, and sound supply chain management has a certain value increment potential. From the perspective of enterprise supply chain management and based on the investigation and analysis of the current situation and problems of supply chain in China's tea industry, the decision optimization scheme of supply chain management in the development of tea industry was proposed in this study from the dimensions of strategic coordination, operation coordination and response coordination.

## 1 INTRODUCTION

Supply chain management is to integrate and optimize suppliers, manufacturers, distributors and retailers to improve their respective business efficiency, save costs and optimize operations in the flow of materials, capital and information, and achieve a greater degree of supply chain value increment. China is a big tea producer and consumer. In 2020, the domestic tea market sales amount has reached 288.9 billion yuan, and tea consumption continues to grow. At present, the upstream and downstream enterprises in the supply chain of the tea industry generally have problems of asymmetric information and low level of information, which leads to the value increment potential of the supply chain has not been given full play. Therefore, the decision optimization in supply chain management is particularly important.

## 2 OVERVIEW OF SUPPLY CHAIN MANAGEMENT

### 2.1 Supply Chain

Supply chain, developed from economic chain, is a functional network chain mode that links suppliers, manufacturers, distributors, retailers and end users into an integral whole, as shown in Figure 1. It can also be held that supply chain is a logistics network. Different enterprises constitute different nodes in this network, and value increment can be realized through the processing and transportation of materials in the operation of supply chain, allowing all enterprises to benefit. In other words, supply chain is also a value-added chain. (Bogers, 2016)

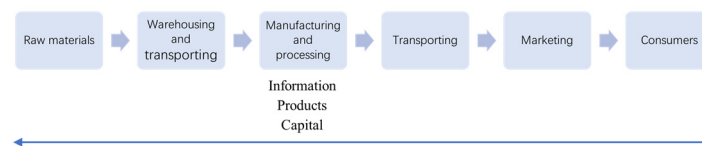


Figure 1: Diagram of Supply Chain System.

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## 2.2 Architecture Design of Supply Chain Management System

From the perspective of tea industry supply chain, this paper analyzes each link of agricultural products supply chain. Considering that agricultural products

supply chain has the characteristics of many participants and many uncertain factors, in order to improve the traceability of the system, the system adopts service-oriented architecture (SOA) design, which divides the system into user layer, display layer, application layer, support service layer, data layer and equipment layer. Its architecture is shown in Figure 2.

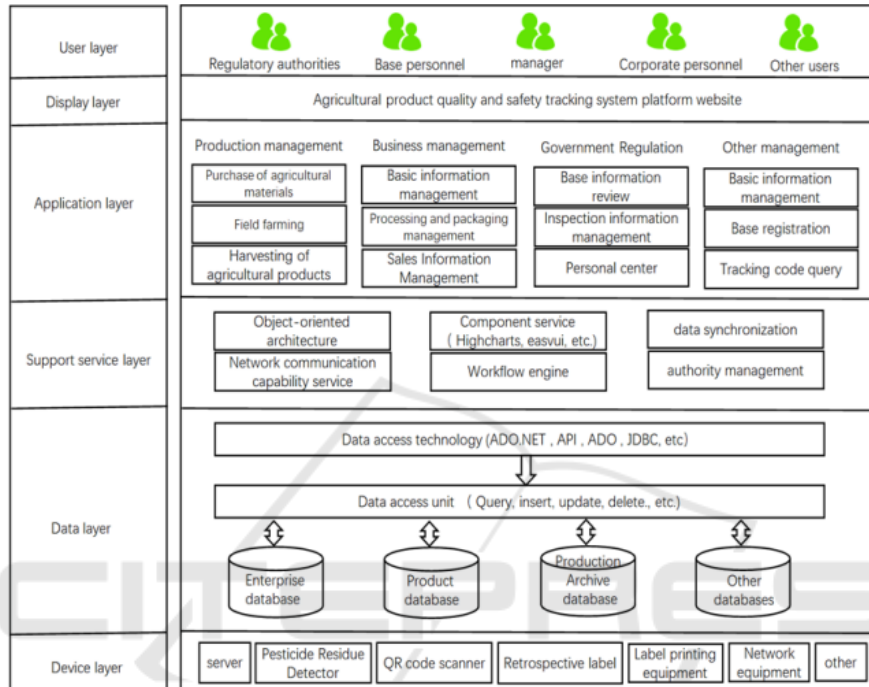


Figure 2: Architecture Design of Supply Chain Management System.

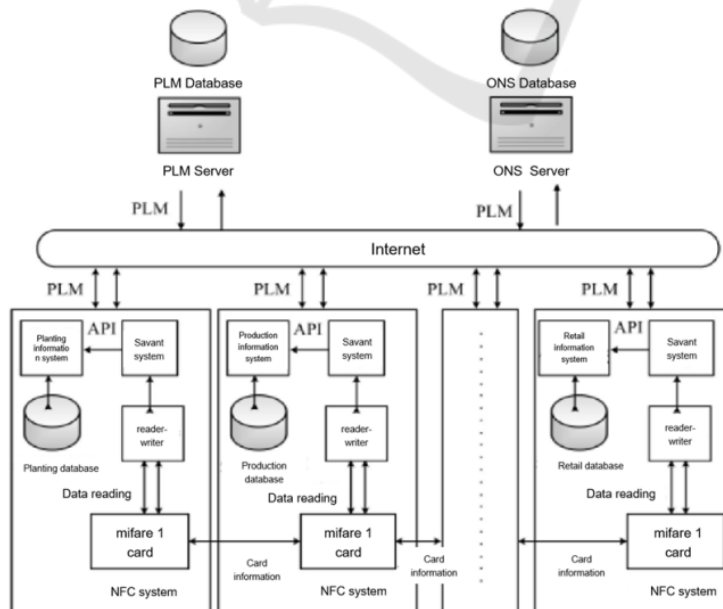


Figure 3: Overall framework of information system.

The overall architecture of the information system mainly includes four links. Node enterprises use read-write devices to write data streams into MF1 according to production requirements, and store the data streams into their own enterprise databases and upload them to the information system platform database. Limited by space, this paper only takes tea planting as an example. In the tea planting process, a reader with number is equipped to write information such as tea address, tea environment, growth situation, fertilizer use, tea varieties, planting time and so on into MF1 card in the form of data stream. At the same time, the generated data stream is associated with the background database of enterprises and regulatory authorities and compiled into corresponding information to be stored in the background database. When the tea leaves are planted, the planting information recorded in MF1 will be transmitted to downstream enterprises. Downstream node enterprises can use mobile phones, personal digital assistant (PADs) or card readers to obtain the information in the labels, and judge whether the read information meets the requirements of product processing.

### 2.3 Analysis of Value Increment Potential of Supply Chain Management

Sound supply chain management has a certain value increment potential, and the following optimizations of a supply chain will lay a good foundation for value increment. First of all, the grasp of information resources should be strengthened. A supply chain is a chain, so each node affects the entire chain. The sharing of commodity information, transportation information, relevant policy information and consumption level information should be achieved as much as possible. Then, the quality of service should be improved. The supply chain is centered on customer service. Most consumers expect faster logistics and better product quality, which requires smooth connection between each node in the supply

chain to avoid wasting time. Enterprises including retailers also need to provide customers with better services. In addition, the supply chain should play the role of “1+1>2” to unite various enterprises to complement each other’s advantages. Through effective management, it can also remove unnecessary error costs, perfect the whole operation process of commodities, improve the enterprise’s inventory backlog, reduce the cost of commodity storage with smoother transportation, and then gradually improve customer product satisfaction, expand market share, and create value increment. (Simmons, 2017)

Supply chain value increment is achieved through the needs of the final consumers, which has four forms generally. First of all, the basic quality of commodities is the most elementary factor to enhance value. Customer satisfaction can be improved to some extent by improving the attributes of commodities to meet their needs. Secondly, time control is a very important part of supply chain management. For the logistics industry, customers have been yearning for high-speed logistics, so the full speed operation between each node of the supply chain can not only save some costs, but also improve the image in the eyes of customers. Thirdly, the location selection is also crucial. From suppliers, manufacturers, distributors to retailers, the location of each supply chain node is better to supplement with each other. The transfer of location and the transportation of commodities also change their value. Finally, the change of ownership of commodities will also result in product value increment. As a result, products, starting from raw materials, are continuously enhanced in value through a series of transmission in the supply chain, and finally accepted by consumers. In this way, the supply chain value increment is realized. Therefore, it is necessary to realize the value identification of consumers through supply chain management, so that consumers can recognize the value of products, benefiting both enterprises and the supply chain itself. Its value increment diagram is shown in Figure 4.

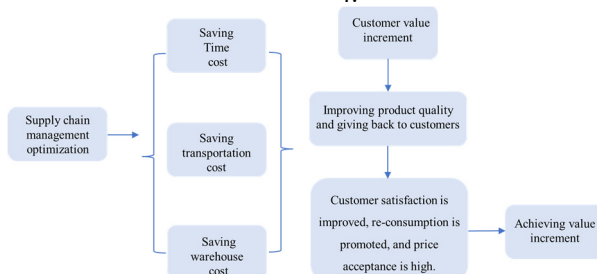


Figure 4: Diagram of Supply Chain Value Increment (Christopher M,2011).

### 3 ANALYSIS OF THE DEVELOPMENT STATUS AND PROBLEMS OF TEA INDUSTRY IN THE SUPPLY CHAIN ENVIRONMENT

#### 3.1 Data on the Development Status of China's Tea Industry

According to the data of China Tea Marketing Association, since 2011, the total amount of tea consumption in China and the total per capita consumption have been on the rise, and the domestic tea market sales amount have reached 288.9 billion yuan in 2020. With the upgrading of consumption and

the improvement of health concept, China's tea consumption continues to grow, and its proportion of consumption in the global market sales is increasing year by year. It is gradually developing into a key market of global tea consumption. By the end of 2020, tea producing areas in China covered nearly 1,000 counties (cities and districts) in 18 provinces (municipalities and autonomous regions), with a total area of 47.4769 million mu, a national tea output of 2.9860 million tons, a total output value of 262.658 billion yuan, a domestic sales volume of 2.2016 million tons, an annual per capita consumption of 1.2 kg, with nearly 500 million tea consumers, an export volume of 348,800 tons, and a total export of \$2.038 billion. (Data source: China Tea Marketing Association)

Table 1: Total Domestic Sales Volume of Chinese Tea from 2011 to 2020 (Unit: ten thousand tons).

Year	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
Domestic sales	220.16	202.56	191.05	181.70	171.06	167.91	150.25	133.83	124.01	109.61

Data source: China Tea Marketing Association

Table 2: Total Domestic Sales Amount of Chinese Tea from 2011 to 2020 (Unit: 100 million yuan).

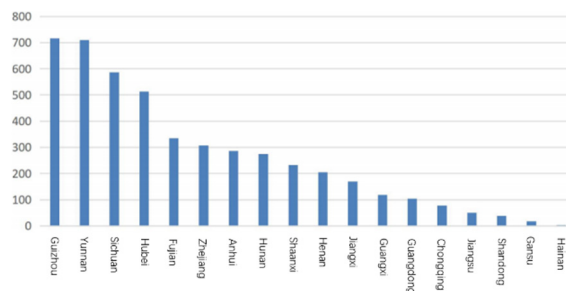
Year	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
Domestic sales	2889	2740	2661	2405	2148	1869	1669	1385	1176	971

Data source: China Tea Marketing Association

Table 3: Average Domestic Price of Chinese Tea from 2011 to 2020 (Unit: Yuan/kg).

Year	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
Domestic sales	131.2	135.2	139.3	132.4	125.5	111.3	111.1	103.5	94.9	88.5

Data source: China Tea Marketing Association



Data source: China Tea Marketing Association

Figure 5: Area of Tea Gardens in Major Tea-producing Provinces of China in 2020 (10,000 Mu).

### 3.2 Main Problems Existing in the Tea Industry Supply Chain

Supply chain refers to the network chain involving the process of supply, production, acquisition, processing, storage, and sale of means of production until finally reaching consumers. The process from tea cultivation to market, including pre-harvest selection of superior varieties, field management, post-harvest processing and storage, pre-market commercial treatment, transportation, and marketing, is a complete supply chain, as shown in the figure below.

The connection and information communication of each link in the tea supply chain is not smooth. Tea producing areas are mainly highland and mountainous areas with remote geographical location. Most of the growers in the upper reaches of the tea supply chain are ordinary farmers and are not sensitive enough to information technology. Most of the registered

processing enterprises in the middle reaches of the supply chain are small-scale enterprises, as well as processing points and cooperatives, who have not established enterprise information management system; there are many points of sale in the lower reaches of the supply chain, and ordering activities are launched to the middle and upper reaches mainly relying on mobile communication, and the dynamic information of market demand cannot be timely and effectively transmitted to the middle and upper reaches of the supply chain. The information transmitted in each link of the tea supply chain is prone to variation, amplification, and hockey stick effect, leading to the information island of horizontal and vertical integration of the supply chain, and enabling the members of the supply chain to maximize their own profits, which damages the overall benefit of the supply chain and produces double marginal effect, not conducive to tea production, processing, and sales related enterprises to make correct decisions.

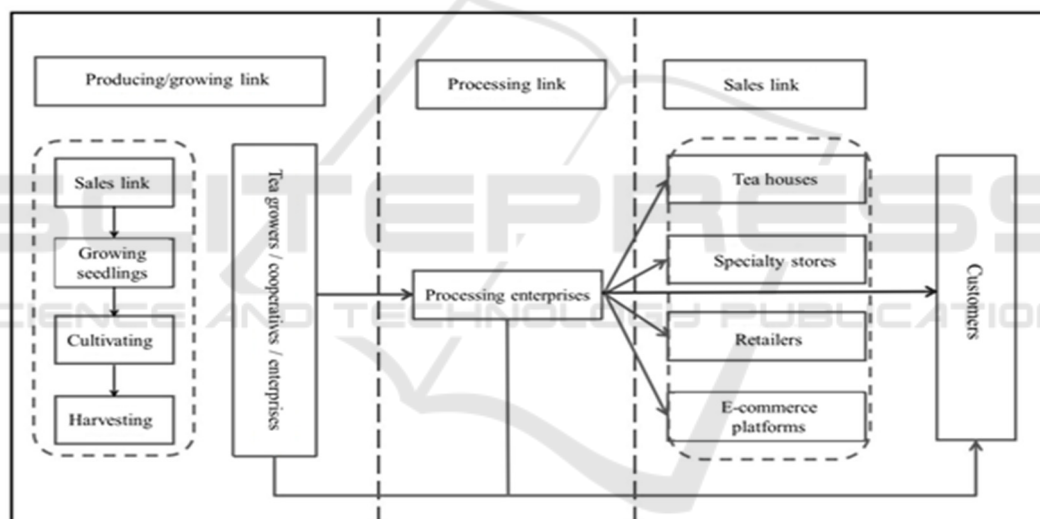


Figure 6: Diagram of Tea Supply Chain Structure.

## 4 DECISION OPTIMIZATION IN SUPPLY CHAIN MANAGEMENT OF TEA PRODUCTS: SUPPLY CHAIN COLLABORATION CAPACITY

The supply chain of tea products is a complex system composed of multiple subsystems, which mainly consists of production and supply subsystems, logistics subsystems, sales subsystems, consumption subsystems and other auxiliary subsystems. A system composed of many subsystems is in a state of self-

organization when the subsystems collaborate with each other to produce synergistic and cooperative effects. The core concept of tea product supply chain lies in realizing the maximization of customer value. The core subject of the supply chain leads the other subjects to form an organic united whole by signing collaborative contracts, so as to transform the tea product supply chain from the original loose state to the self-organization state in pursuit of common core interests. In the continuous evolution of the collaborative system, the supply chain system is transformed from disordered collaboration to orderly collaboration. (Huang, 2000)

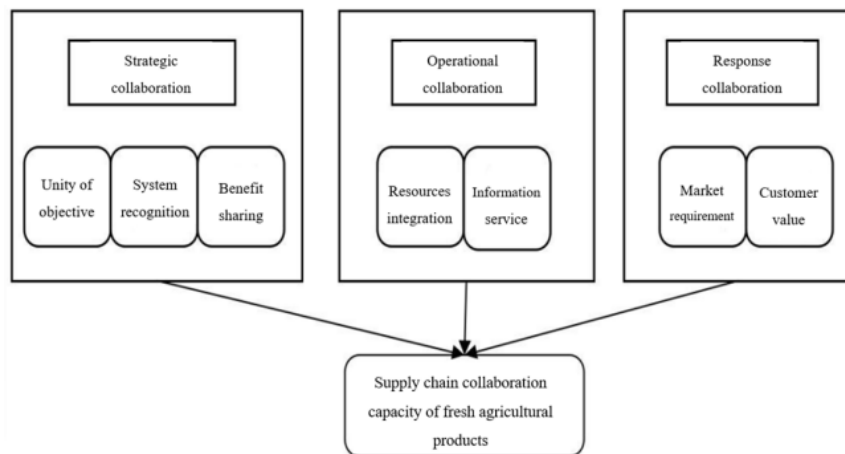


Figure 7: Supply Chain Collaboration Capacity.

### 4.1 Strategic Collaboration

By unifying the development plan of tea product supply chain, on the basis of determining the consistent collaboration goal, stipulating the collaboration scope and degree and formulating a reasonable collaboration system and benefit sharing mechanism are the foundation of the tea product supply chain system collaboration. For example, most enterprises regard supply chain collaboration as a part of their development strategy, formulate unified strategic planning and operational objectives, and make all collaborative subjects of the supply chain abandon pursuing the maximization of their own interests. In the meanwhile, through collaboration, the core competitive advantages of each subject can be brought into play to cultivate consumers' trust and purchasing habits, so as to promote enterprises to establish a firm collaborative relationship from the strategic level, and promote collaboration in operation and response of tea product supply chain. Therefore, this paper argues that strategic collaboration has a significant positive impact on operational collaboration and response collaboration.

### 4.2 Operational Collaboration

Operational collaboration is the further refinement of collaboration objectives under the guidance of strategic collaboration. For the tea product supply chain, the strategic decision content developed by strategic decision-makers is detailed through the operational collaboration of supply chain resource integration and information service support, which is the operation basis of strategic collaboration. For

example, West Lake Longjing tea is very sensitive to changes in temperature and humidity. Once the temperature is raised, aging metamorphism occurs easily. The suitable transportation environment for the tea is very strict, requiring precise temperature and humidity. Generally 10 degrees Celsius is appropriate, 0 to 5 degrees Celsius is the best, and humidity is less than 70%. Short distance transportation also requires to avoid carriage moisture, maintain temperature control, and keep ventilation. The tea is best stored in vacuum, and the transportation equipment is ideal to be clean, dry, odor-free and low-temperature refrigerated cabinet, so as to avoid oxidative deterioration, thus affecting the taste and aroma. Compared with the general logistics system, the construction cost of specific logistics system of tea products is high, and the daily operation and maintenance cost of their facilities and equipment is also expensive. Also, it is difficult for a single subject in the supply chain to build a dedicated logistics system to meet market demand by its own strength. In view of this, special logistics centers for tea products can be built through the coordination of logistics resources to share cold chain logistics facilities and equipment, thus relieving financial pressure and improving the utilization rate of cold chain facilities and equipment.

### 4.3 Response Collaboration

Customers' demand for high-quality shopping experience of tea products forces the supply chain to constantly reduce operating costs and improve response speed. For example, once the market demand for tea products changes, the business process of the supply chain should be recombined through collaboration to improve its response speed.



Each cooperative subject should clarify its own positioning and responsibilities in the supply chain, and remove the barriers to collaboration among various subjects, which drives the change of the original operation mode of the supply chain, so as to carry out business and assign tasks at any time, thus reducing the collaborative operation cost of the supply chain and obtaining the advantage of rapid response to the needs of end customers. (Rosenzweig, 2009)

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