

## THE CONTROL SYSTEM OF ROAD FREIGHT COST LOGISTICS IN NETWORK ENVIRONMENT

HE QIONG, MING JUN, ZHANG PEILIN

SCHOOL OF MANAGEMENT, WUHAN UNIVERSITY OF TECHNOLOGY, WUHAN,  
P.R.CHINA, 430070

**Abstract** In the process of the domestic road freight transport enterprises transformation to modern logistics enterprises ,road freight transport enterprises should find a balance between the logistics costs and logistics services to promote their development. In this paper, it applies the process analysis and combines with the logistics costs and logistics management information systems and so on theories, according to the characteristics of road freight transport enterprises, to construct a suitable road freight logistics cost control system.The conclusion is that in order to achieve a reasonable logistics costs control, it should take the customers' demands and the information sharing for the account.

**Keyword** Network environment;Road freight transport enterprises;Logistics cost control system

### 1 Introduction

Road freight transport enterprises which based on their own merits and domestic three-dimensional transportation network transportation system, make use of the rapid development of modern network technology to enable computer management information system that can be released through the network to collect information and can analyze, judge and decide relevant informations, so as to enhance the competitiveness of enterprises . Making full use of logistics cost control system also can reduce the artificial errors to realize information sharing, make good logistics plan and have real-time logistics costs control to meet high-speed, safe, reliable, in particular the needs of low-cost. At present, some large-medium-sized enterprises has established its own logistics management information systems, but some systems are too complex to focus on road freight transport and distribution enterprises management ,some others are too simple to manage or co-operate between enterprises on the informations sharing.

This article is based on the thinking of the logistics management information systems such as logistics management theory, and takes the road freight transport enterprises in the logistics supply chain into account, to design the logistics cost control system in the network environment for the road freight transport enterprises so as to provide a practical application.

### 2 The constitution of road freight transport enterprises' logistics cost

The output of third-party logistics is the logistics service, with the invisible, the transient and diverse of the three major characteristics. Logistics service determines the cost of third-party logistics companies operating mainly for indirect costs, there is no cost of production and sales. Road freight transport enterprises as third-party logistics platform, manage and control logistics costs in the supply chain ,and enhance the cooperation between the up-down stream enterprises.

#### 2.1 Road freight operating costs <sup>[1]</sup>

Road freight is mainly route transport,the total operating costs consist of freight station operations cost, distribution center operating costs, transportation operating costs.

Freight station operations costs contain warehouse costs, cargo handing costs and tools depreciation costs. Most of the cargo terminals are leased, the rent on the storage costs can be seen as warehouse costs. Accepted the goods, sorting, cargo collection, handling loading and unloading functions operating costs reflect on the salaries of stuffs. In freight station the manual operations are main,and tools to use a relatively small can be therefore ignored.

The composition of a distribution center cost are as the same as the freight stations, warehouse costs and the cargo handling cost and use the same measurement in freight station, but here the tools is known as low priced and easily worn articles, and included in amortization.

Transportation costs mainly related to the use of the vehicles, and vehicle depreciation costs, maintenance costs, fuel, toll crossings roads or bridges, vehicle insurance, road maintenance fees, tire fees, and other personnel costs.

#### 2.2 The logistics cost of road freight transport enterprises

Road freight transport enterprises logistics costs are as follows:

Documents dealing cost. In order to meet customer needs, to improve service levels, to make sure of delivery time to maintain the competitiveness, the enterprises to use information systems is necessary. Documents dealing costs contain the time cost caused by document transmission, as well as the cost of data processing system and so on.

According to sub-processes Storage costs include: warehousing plan operating costs, sorting operating costs, warehouse transport operations cost. Most of the warehousing costs do not change with the inventory levels, but with the numbers of storage locations.

Distribution and transportation costs in accordance with aspects of distribution processes, include distribution and transportation, sorting costs, and loading expenses. According to the customer's requirements and plan time, sort, process and collect the goods in the warehouse, freight stations. Distribution processing is divided into sets of collection, equipment, distribution, loading, transport distribution, delivery, return and so on [2].

### **3 Network security and the basic structure of the database**

#### **3.1 Network Security**

Logistics cost control information system running on the server, it is important to protect information, not only to guard against viruses and but also to other malicious acts of theft information. Design can be considered of the following aspects [3]:

(1) Database Security. It is not allowed that the database and database access are put into the same directory, database file extension can be changed appropriately into web document, to prevent from the hacker search software.

(2) Database backup and update. Automatic backup procedures run in the local and removable medias, so as to be convenient for off-line inspection, maintenance; And update the database when there is no change in the business time.

(3) Password management. Replace administrator password in time, and store encrypted Plaintext into the corresponding documents.

(4) Permission setting. Road freight transport enterprise's information system needs certain information shared with other enterprises, staffs who log in the database should be limited to the necessary permissions.

#### **3.2 The basic structure of the database [4]**

##### **(1) Database design**

When we design the database, we must meet customers' needs, then establish a practical system, including the cargo information, handling cargo documents, distribution logistics control, inventory management, vehicle operation management and so on.

##### **(2) Contents of database**

According to design principles and computer network technologies, it can list the following data items:

Cargo information includes that the name of cargos, weights (tons), volume(square), packaging, delivery, destination, date, remarks, etc.

Customer information includes the document number, cargos, quantity, contact, telephone, volume (square), packaging, delivery, destination, date, payment method, remarks, etc.

The vehicle information includes the vehicle identification number, status, current location, destination, types, car length (m), load (tons), sources of information, update time, Remarks, ect.

Distribution logistics control database includes the existing quantity of cargos, the quantity of sent catgos, etc.

Orders for statistical database, includes the commoditises' name, quantity, weight, destination and the charges.

System management information includes, user's ID, user name, password, permissions and so on.

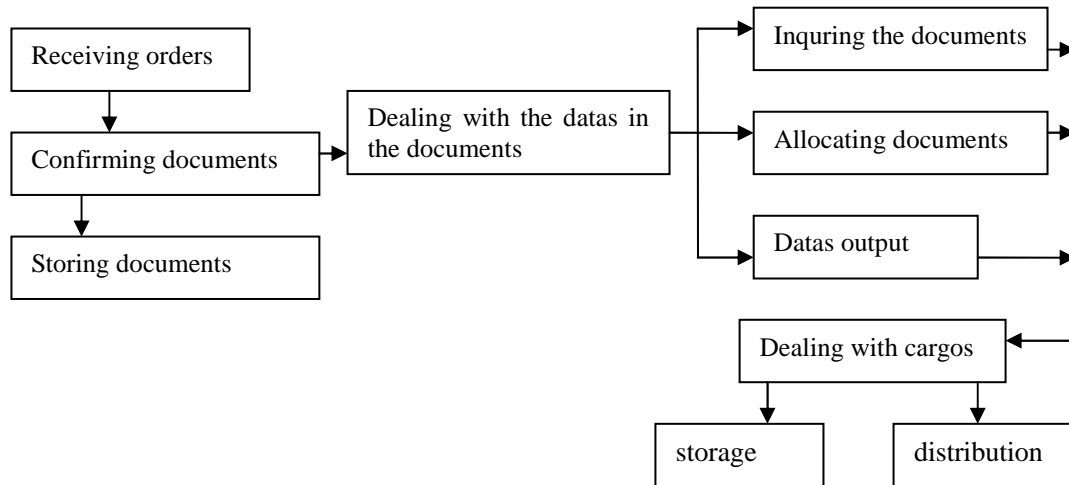
Users' record information includes user's ID, user name, password, permissions, status and so on.

### **4 Logistics cost control process design**

Process Cost Control is which through know and analyze the working processes, remove non-value-added activities, reduce the ancillary-value-added activities, and continuously improve value-added activities, to improve efficiency. Considering the logistics cost control of road freight transport enterprises, the first issue is the customer needs, then we can design the effective control

processes, in that reducing the enterprise and the overall supply chain logistics costs.

**4.1 The cost control process of dealing with documents in Figure 1:**



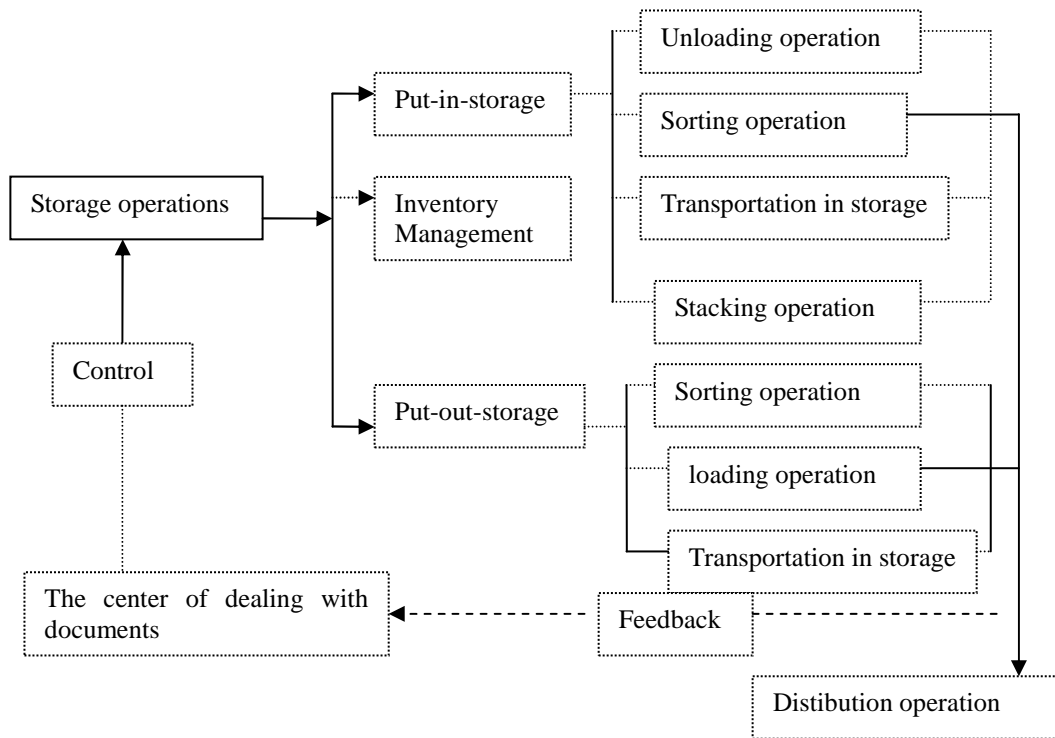
**Figure 1 Flow chart of documents dealing with cost control**

Road freight transport enterprises usually provide services for the less-than-truckload and activities in logistics outsourcing from producers or sales, and the modern logistics technologies are rapidly developing, so it can make use of information technology tools to improve the efficiency of receiving. After have received documents, road freight transport enterprises should confirm the contents and information of the cargos in the documents, in order to prevent from errors. Document processing system can be set up the functional modules for confirming documents, which conclude two aspects: First it should confirm customers' credit, especially those who have had contacted with enterprises; Second, it also should confirm document type, quantity, time, transport prices, collecting freight, ect.

Data processing operations on the document by giving commands and instructions, and in accordance with the requirements of documents, makes a decision to store or distribut. It can use the information technology to control the logistics cost, and classifies and summarizes information after the system confirms the documents, in order to effectively carry out logistics operations. and get feedback on the efficiency of logistics activities, so as to prepare for process improvement.

**4.2 Storage cost control process**

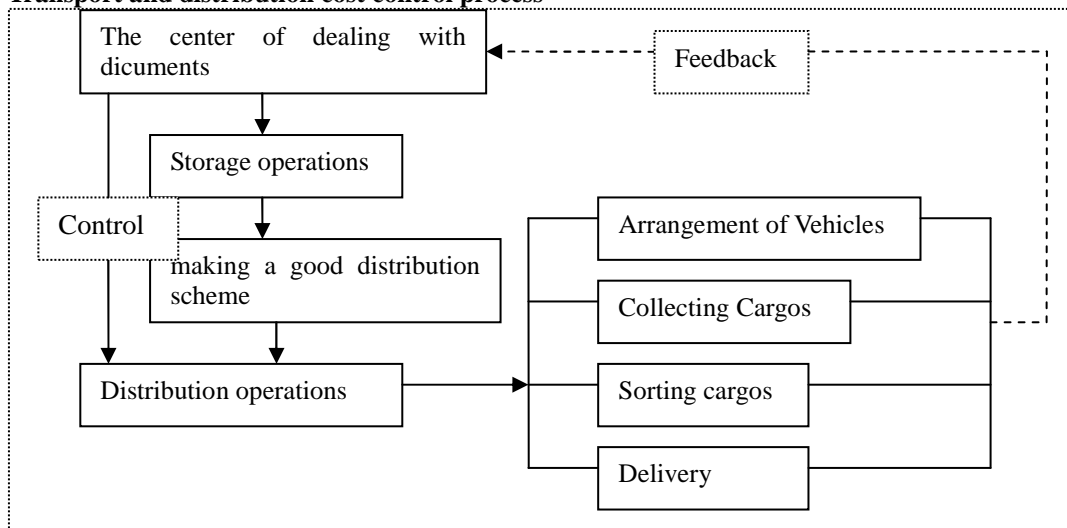
Warehouse in road freight transport enterprises play an improtant role in logistics management and logistics services. Integration of transport, stable supply and demand, circulation and distribution , all that functions are the value-added services of warehousing in the logistics system. As the inventory cost caused primarily parts of warehouse cost, it's necessary that we should, according to the actual situation, classify stock goods, standardize stock measurement and management, in that we can not only reduce the backlog capital in the upper reaches of enterprises and warehouse management cost, but also improve the road freight enterprises' storage service capabilities. Storage cost control process as shown in Figure 2:



**Figure 2 Storage cost control processes**

Therefore, the road freight transport enterprise's storage cost control is primarily put-in-storage and put-out-storage operating cost control.

**4.3 Transport and distribution cost control process**



**Figure 3 Transport and distribution cost control process**

The higher cost of the transport and distribution, the lower enterprise's profits will be, and the the more customers will pay. Therefore, the distribution within the established objectives and equipment, the most critical part is how to make a good distribution scheme, and the path of choice. The enterprises control the transport and distribution cost with monitoring the results of distribution.

**5 The main system functional modules design**

In accordance with road freight logistics enterprises' cost control flow analysis, the functional modules of the system should be to achieve the feedback control processes.

### **5.1 The function of dealing with documents cost control system**

Today, the majority of domestic cargo transport companies still use invoices to fill in for accepting cargos, however, as enterprises who provide sales and production enterprises with logistics services for a long time, will choose to use order on line or telephone fax. In short, for the realization of the logistics cost management and control, it is necessary to turn the document into a logistics information.

After document information put into the system, it follows to confirm the content of documents, generally including customer information (name, phone, the document number), goods, quantity, delivery point, the payment (cash on delivery or cash basis), delivery vehicles , routes, deadline date,ect. Database should include all real-time status that the cargos information in the documents have put into system to reach at their destinations safely.

### **5.2 The function of Warehouse management cost control system**

Generally speaking, warehouses are usually divided into reserve area warehouses and cargos circulation distribution warehouses. The large-medium-sized road freight transport enterprises usually not only have self-storage for other production-oriented enterprises to store a large number of raw materials or goods, also have freight stations or allocation stations to distribute or storage cargos of the temporary cargos.

#### **5.2.1 The function of put-in-storage dealing cost control**

Freight stations may accept the piece goods which is uncontrollable, so they can only be based on their surrounding environments, seasonal and unexpected events factors to predict the amount of the cargos. As a result of a good reputation and recognition of the transport services quality in the past, Large-medium-sized enterprises take responsibilities transporting and distributing goods for some production and sales enterprises, in that these cargos put-in-storage tend to have relatively fixed task time and quantity. The warehouses for reserve storage, can serve as a link of production and consumption, so put-in-storage plan can be developed directly from the leasing business. Therefore, storage cargos can be arranged in different orders, to plan and choose the approaches.

In addition to making put-in-storage scheme well, discharge operating needs to know relevant datas before the put-in-storage, and uses operations as less as possible, such as obtaining goods arrival information from suppliers to store in the computer. When the goods arrive at the warehouse, use the barcode number of goods to search the cargo certificate serial number, then to retrieve the information of the goods, after that confirm the quantity of receipt goods ,at last unload the goods into the warehousing.

According to different orders, the sorting and stacking operating , can use working in dispersion, orders block operations, orders in batches operation to control cost.

The main way to control the transportation cost in warhouse,is using the forklifts, conveyors, belt conveyors, automatic navigation vehicle, rail car ,ect,to realize transport automation [5].

#### **5.2.2 The function of inventory management cost control**

The inventory management of road freight transport enterprises ensures to verify the correctness of cargos in inventory. Freight stations are in different locations, so warehouse management operations can progress with the decentralized or the central computer system. Decentralized computer system manages the shelves of goods in warehouse, and the central computer works for all inventory management. In this way it will prevent from errors while verifying inventory.

#### **5.2.3 The function of put-out-storage dealing cost control**

Except loading operations, other cost control operations are the same as put-in-storage. Loading operations cost control can follow the way of receiving storage, and summarize and pick orders based on the scheduls in documents, to improve the efficiency, and at last can make a timely delivery.

### **5.3 The function of transport and distribution cost control system**

Transport and distribution are the most important logistics activities for the road freight transport enterprises, which determines the capacity of the logistics.

#### **5.3.1 The function of vehicle dealing cost control system**

According to the summary of put-out-storage information, it should make a timetable, allocate the vehicles, simulate logistic vehicle routing problems, arrange vehicles, final confirmation of the output. With the timetable, it can turn the directions to the codes, then achieve the most effective mixed loading with the schemes and locations of freight stations. Simulation logistic vehicle routing problems base on the location, distance, time, cost and vehicle information, and linear models or AI distribution rules decided model, then simulate and modify several times, to provide a optimum delivery path and

distribution of vehicles as a final decision .

### 5.3.2 The function of data exchange cost control system

Transport is the core service of the road freight transport enterprises, so it will greatly improve the logistics efficiency with reasonable control of transport cost. Because of the road transport enterprises based on trunk line transportation and cargos from different business, besides effective arrangements for distribution with the road freight transport enterprises themselves, it can enhance the control capacity by the information technology, that is the establishment of the data exchange systems between the freight business and the owner. Data exchanging includes the location of the cargos, confirmation of acceptance, applications for payment /payment of the check. The base of the data exchanging is the serial number of cargo receipt, which also names as cargo tracking serial number. Cargo tracking serial numbers should be consistent with the put-out-storage information, in that it is not only convenient to check information, but also to get a more accurate cargo information. .

At the same time, the system should have the functions of cargo status and vehicle operation management system, so that to keep a track of cargos and inquire the location of the cargos.

Based on the supply chain principle, this article structures logistics cost control system for customers through various processes and functions of sub-system analysis.

## 6 Conclusion

In addition to cost control theory and business process reengineering theory, this article build a control system of road freight cost logistics in network environment, taken many logistics management information system module features into account for the design, which consists of three subsystems: the dealing with documents cost control system, the warehouse management cost control system, the transport and distribution cost control system. According to the road freight transport enterprises operation processes, the structure of the customer-oriented road freight logistics cost control system, is clear and targeted, also has a certain expanded capacity, so to some extent can help do a good job in the logistics cost control and improve efficiency. However, road freight transport enterprises as an important part of the supply chain, and the service varies, so they can not be divided from the supply chain to consider their own interests, instead the entire supply chain logistics enterprises all should attach importance to solve cost contro. In addition, it may also consider horizontal cooperations and the model structure and so on to slove for this problem.

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