

BASED ON AGENT OF LOGISTICS INFORMATION SYSTEM RESEARCH AND DESIGN

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ABSTRACT

Along with the development of informatization and advancement of computer technology, it is of great significance to do research on the informatization of the delivery of logistics company. Based on Agent, the information platform of logistics company has been constructed, to informatize links of transport、 storage、 package、 Military Material Handling System, distribution processing and delivery, and intelligentize transportation between sales network and expense budget. After practical appliance, it is proved to be of practical value.

Keywords: *Logistics, Dispatching, Agent, Informatization*

1. INTRODUCTION

In this rapidly changing times of knowledge economy and information explosion when globalization has become an irresistible trend of economic development, logistics distribution enterprises are facing enormous pressure and grand challenges, which has attached great significance to the research on the distribution informatization^[1-4].The information system based on Agent, through building up a suitable logistics distribution information system to realize information resources sharing as well as management and control of distribution, serves as an important means and method to further deepen enterprise reform, import advanced management theories, tap potentials of increasing efficiency, improve the overall operation and management of the enterprise and to enhance enterprise's resilience to the market^[5-11].

2. MAJOR PROBLEMS WITH THE CURRENT LOGISTICS DISTRIBUTION INFORMATION SYSTEM AND THE ADVANTAGE OF INTRODUCING AGENT

2.1 The Incapability Of Conducting Accurate And Imely Production Cost Accounting

Cost management has always constituted the theme of enterprise management. It is particularly important in the fast changing market environment to figure out how to meet the diversified demands of customers without delay, carry out scientific and

reasonable cost forecast, analysis and control, and provide the enterprise managers with accurate and timely information for them to make business decisions. However, the current logistics operations are still applying traditional cost accounting method, which extensively calculates and manages the cost, not to mention adopting the idea of calculating the cost of each work stage or each production process.

2.2 Mutually Independent Management Information And Severely Distorted Financial Statistics Which Have Seriously Affected Enterprises To Make Scientific Market Decisions.

The fact that different Branches of one enterprise adopt separate financial systems with mutually independent financial information and have to deliver their statistical statements level by level which usually lag behind and contain discrepancies in figures and inadequate information will bring great difficulties to decision-makers and leaderships of the enterprise to grasp accurate market information and make proper market-based decisions and forecasts. It can be concluded that the market feedback information system has greatly fallen short to meet the management requirements of enterprises.

2.3 Loosely Implemented Forecasting, Budget Planning And Monitoring Of The Logistics System

The current logistic system, which has not been systematically designed through following these six



critical steps-goal setting, forecasting, budget planning, monitoring, reporting as well as analyzing and evaluating, can not integrate strategic objectives of the enterprises with their business management, so as not to be able to realize cooperative management of enterprise business.

2.4 The Advantage Of Introducing Agent

It is generally believed that Agent has such features under certain circumstance as purpose-driven, autonomy, reactivity, initiative and sociability, and can act flexibly and independently. Agent enables fast reconstruction and effective integration of an agile supply chain, and the fast response of that supply chain to the market change. It is therefore of great significance to introduce Agent to Branches of logistics distribution enterprises.

3. DESIGN OF LOGISTICS DISTRIBUTION SYSTEM BASED ON AGENT

3.1 Operational Process Of The Logistics Distribution System Based On Agent

The logistics distribution system based on Agent allows customers to place an order or track their order through the system's network. The operational process starts with a customer's inputting his order into the internet, and the system will conduct relevant calculation which allows the customer to track his cargo through internet at any time and any place. The system will receive customers' complaints and send greeting cards on occasions like a customer's birthday, festivals and holidays. It also enables the head office to monitor its Branches by conducting real-time tracking from picking up a cargo, storage, processing and packaging to transiting, transportation and distribution so as to realize real-time positioning and to take prompt remedial measures in case of any error. In addition, with the help of the system, the head office can carry out financial management for each of its Branch, producing monthly statements and generating statistics by categories. Statistics generated by the cargo type, through being compared with the data of the last two months, would help enterprises find out rules to identify the main cargo type of each month for that Branch, while statistics by the cargo handling way, such as cargo receiving, transiting and distributing, would help enterprises identify the role of that Branch. Figure 1 specifically shows the operational process.

The whole operational process implements functions as below:

A. Transportation function based on Agent

Transportation is one of the core business of logistics as well as an important function of logistic system. To choose an appropriate way of transportation is of great importance to realize high logistic efficiency. When deciding on means of transportation, one must weigh the cost and the service required by the transportation system, and make decisions based on the service features of cargo carriers, such as the freight, transit time, frequency, transport capacity, cargo safety, time accuracy, applicability, flexibility, network, information and etc.

B. Storage function based on Agent

Storage is of the same importance as transportation in the logistics system. It comprises a series of activities such as stockpiling, management, safekeeping, preserving and maintenance, collectively performing the storage function of preserving the complete usage value and value of the cargo as well as further processing the cargo in the logistics center before distribution. Along with the economic development, logistics service has transformed from distributing large volume cargoes with less variety to distributing small volumes with multi-varieties in small batches and multi-batches, and the storage function has shifted its emphasis accordingly from storage efficiency to accurate and smooth dispatching and distribution.

C. Packaging function based on Agent

Most of the cargoes need packaging in different ways and to different extent so as to reach customers in good condition through logistic process and to meet the requirements of customers and end users. There are two types of packaging, industrial packaging and commodity packaging, whose purposes are respectively to facilitate transportation and protect the cargoes in transit by dividing them by unit and to help the selling of the cargoes. It can be concluded that the packaging function is embodied in such aspects as protecting the cargoes, unitizing the cargoes, facilitating transportation and advertising, of which the first three aspects are of logistic functions while the last one serves as marketing function.

D. Loading and unloading function based on Agent

Loading and unloading is an indispensable link of logistics coming along with transportation and storage. It serves as the intermediate nodes linking up transportation, storage, packaging and distribution processing. It is also an integral part in cargo inspection, maintenance and preserving during storage and other logistic links to load or

discharge, transfer, sort or classify the cargo. Loading and unloading takes the typical form of using container or pallet, employing handling machinery like cranes, forklifts, conveyor belts and various kinds of trolleys. It occurs frequently during the whole logistic process and therefore has become one of the major reasons of cargo damage. Enterprises would achieve better economic efficiency by managing the loading and unloading, especially through choosing and reasonably applying proper handling method and machinery to realize rationalization handling, and through minimizing the times of handling to reduce costs.

Distribution processing is to process and make physical or chemical changes to the cargos in the course of its flow from production field to the selling stage with the purpose of promoting product sale, maintaining quality and realizing logistic efficiency. It mainly consists of activities such as bagging, quantitative inner packing, tying tags and labeling, allocating, selecting, assorting and printing marks. The function of distribution processing is to conduct primary processing to bring convenience to users; improve utilization of raw materials, processing efficiency and equipment utilization; bring about highest efficiency potentials of different means of transportation; and to enhance product quality for more profits.

E. Distribution processing function based on Agent

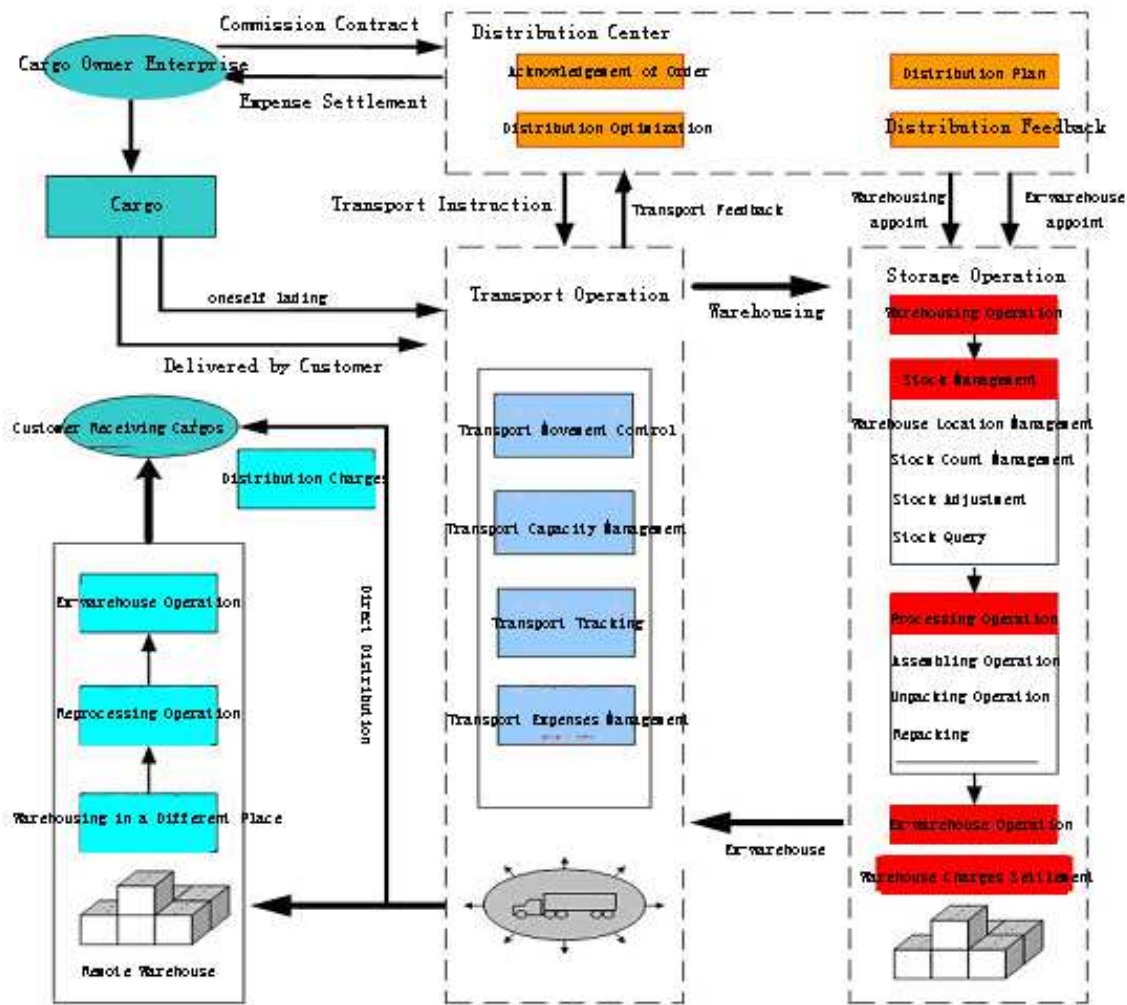


Figure 1 Operational Process Of The Logistics Distribution System Based On Agent

F. Distribution function based on Agent

As a special and comprehensive logistic activity, distribution closely integrates the business flow with material flow. It practically includes all the functional elements of logistics, and can be deemed as a miniature or a complete operational process of logistics in a smaller scope. Generally speaking, distribution combines the functions of loading and unloading, packaging, storage and transportation, through which it fulfills its purpose of delivering the cargos.

G. Information service function based on Agent

Information technology is necessary to guarantee the normal operation of modern logistics. The information service function of logistics system includes providing information about the plans, forecasts, dynamics (traffic volume, numbers of received, dispatched or stored cargos) related to functions described above and other relevant information about expenses, production and market activities. The management of financial flow information requires building up information

system and channels to properly designate information subject and select the method of collecting, summarizing, counting and applying information, so as to ensure reliability and promptness of the information.

3.2 Cargo Forwarding Model Based On Agent At Different Branches

When a customer consigns his cargo at Branch A and requires the cargo to be delivered to a customer located at Place C, Branch A will firstly warehouse the cargo upon receiving it, then pack all the cargoes with Place B as their destination and effect the delivering. Branch B will firstly unpack the package received from Branch A to check the cargos and send back wrongly dispatched ones, then pack those of the rest with Place C as their destination and effect the delivering to Place C. After receiving the package, Branch C will firstly go through the same procedure as Branch B, and then distribute cargos to customers immediately according to the delivery address. Figure 2 shows the whole operational process.

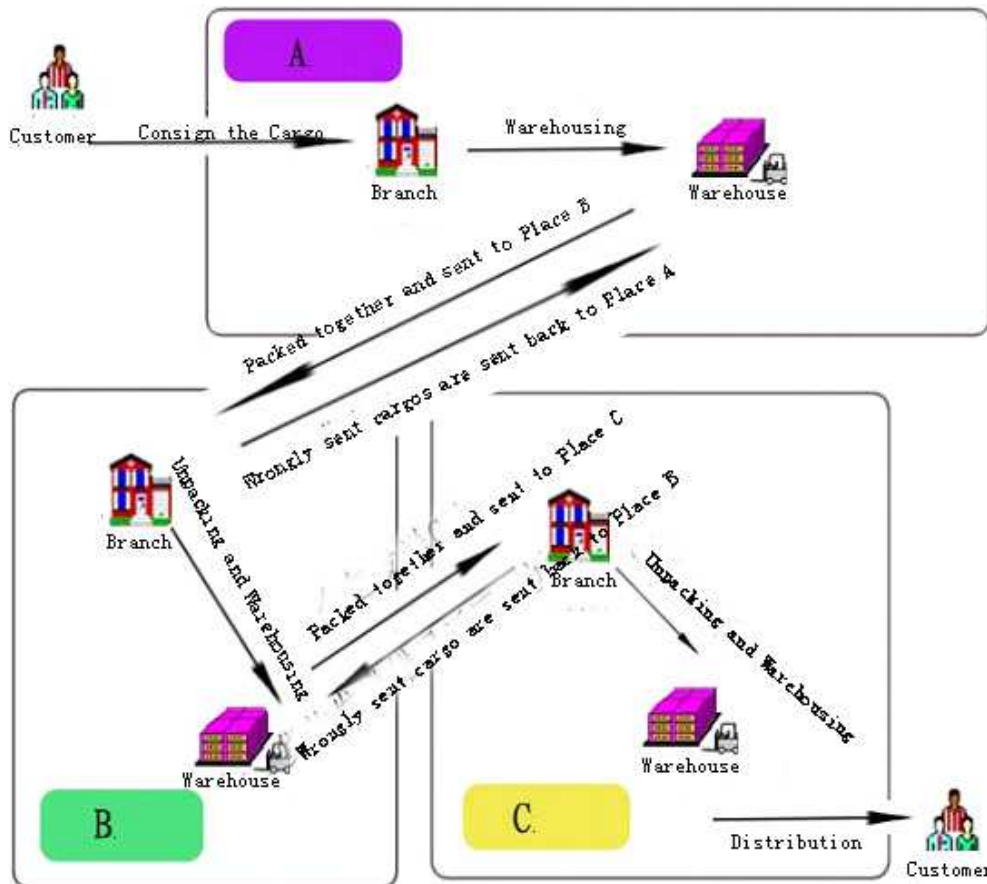


Figure 2 Logistic System Model And Data Flow

3.3 Cost Calculation Of Consignment Based On Agent For Customers At Different Branches

The cost is mainly influenced by three aspects as below: 1) transportation cost, which tops the considerations when choosing the way of international cargo transportation as it is usually a heavy burden due to long transport distance; 2) Operating speed, generally affected by transport distance and number of transit stations. Longer transport distance and more number of transit stations will cause more time and capital spent during the transportation. Given this, reducing the number of transit stations will help liberate the occupied capital as well as to seize the market; 3) the specialties and features of the cargo, which are sometimes decisive to the choice of the logistic mode.

The formula to calculate the cost of a customer to consign his cargo is shown as (1) to (5):

$$\begin{aligned} \text{Total Cost} &= \text{Cost at receiving place} \\ &+ \text{Cost in transit} + \text{Cost at destination} \end{aligned} \quad (1)$$

Cost at receiving place:

$$\text{Cost} = \text{TCost} + \text{RCost} + \text{DCost} \quad (2)$$

Note: Cost=total cost; TCost=transportation cost; RCost=acceleration cost; DCost=storage cost

Cost at destination:

$$\text{Cost to receive} + \text{Cost to distribute} \quad (3)$$

All kinds of cost parameters are set respectively so as to lay a foundation for the future computer calculation

Total Cost = Cost at receiving place +

$$\begin{aligned} &\text{Cost in transit} + \text{Cost at destination} = \\ &\text{TCost} + \text{RCost} + \text{DCost} + \text{NCost} + \text{T} \end{aligned} \quad (4)$$

$$\begin{aligned} &+ \text{T}_0 + \text{P} = \text{GCost} * \text{LCost} * e + \text{RCost} \\ &* \text{X} + \text{DCost} * \text{Y} + \text{NCost} + \text{N} * \text{T} + \\ &\text{T}_0 + \text{P} \end{aligned}$$

Note: GCost=cargo weight; T=cost in transit; LCost=transport distance; e=standard parameter; RCost=acceleration cost; X=acceleration cost parameter; DCost=storage cost; Y=storage cost parameter; N=times of transit; T=cost of each transit; T₀=cost to receive the cargo; P=cost to distribute.

After the calculation, please check whether you are a membership of the company and which class of membership you own, then multiply the total cost by your membership parameter as shown in formula (5):

$$\text{KCost} = (\text{Total Cost} + \text{liutong}) * \& \quad (5)$$

Note: KCost=the price offer to the customer; liutong=the circulation expenses of company; &=the class of membership

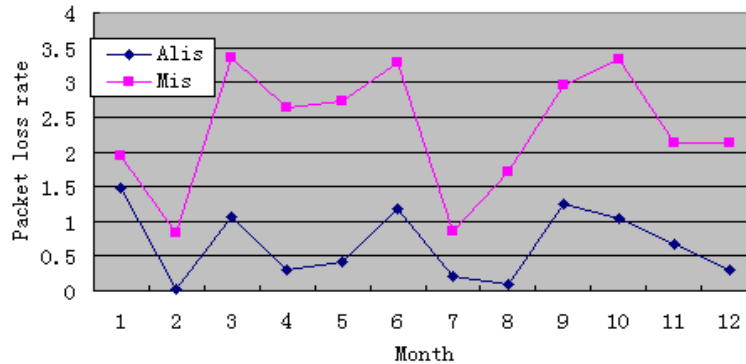


Figure 3 Comparison Of Cargo Loss Rate Of Each Month Between Two Systems

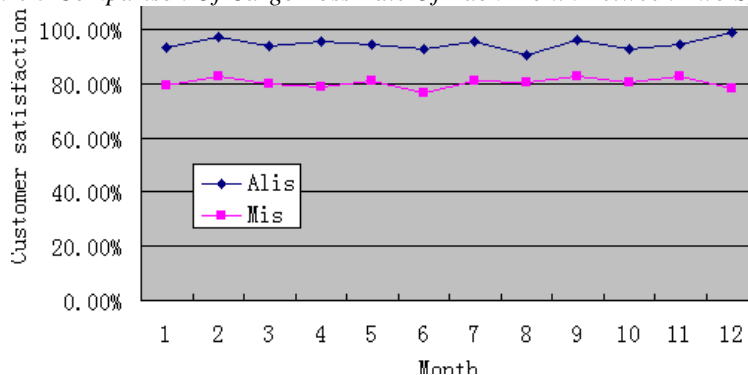


Figure 4 Comparison Of Customer Satisfaction Of Each Month Between Two Systems



4. PERFORMANCE COMPARISON

An express company conducted an experiment in two of its Branches to evaluate the performance of this algorithmic. It applies the management system based on Agent as described in this article in its Chongqing Branch while the traditional management system in its Chengdu Branch, analyzing and comparing the data of cargo loss rate, customer satisfaction and etc. Comparison of cargo loss rate is shown in Figure 3, in which Alis representing the management system based on Agent has a loss rate under 1.5% while Mis representing the traditional management system has a loss rate under 3.5%, higher than that of Alis. It is also shown in Figure 3 that february is the month with the lowest cargo loss rate. It may attribute to the fact that this month coincides with the major Chinese traditional festivals when 99% business units are off for 7 days and 40% business units are off for 15 days, and the fewer volume of cargo in logistics results in the lowest loss rate. The loss rate is relatively high in March, June, September, October and November, mainly due to the starts and ends of holidays as well as traditional festivals, such as Children's Day, Teacher's Day, which lead to large volumes of online shopping and huge demand for logistic service. Figure 4 shows the comparison of customer satisfaction of each month between those two types of management systems, suggesting that Alis with a customer satisfaction rate of 94% is much higher than the 79% of Mis system.

5. CONCLUSION

With the development of informalization and advancement of computer technology, research on the distribution inforamlization of logistics and distribution enterprises has become more and more important. Building an information platform for those enterprises based on Agent will help realize the informalization of such logistic links as transportation, storage, packaging, loading and unloading, distribution processing and distribution, and contribute to the intellectualization of cargo forwarding and expense budgeting of different Branches. The system based on Agent has proven to be highly accurate, prompt, flexible, and reversely traceable on each logistic link, having high wisdom as well as certain theoretical significance and practical value.

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