The Study of Transport union Based on The Information System

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Abstract: in the perspective of transportation enterprises, two types of transport association are proposed, horizontal alliance and vertical alliance. We set up a complete structure of a transportation alliance, which includes organizational structure and the framework of the information system and function modules of the system. Finally, the paper used Cournot Model to analyze the economic benefits of transport alliance to proof that transportation enterprises can reduce the cost of transportation, increase economic benefits and achieve a win-win situation by transport alliance.

Keywords: Transport union; System structure; Economic benefits

INTRODUCTION

Transportation is the linkage of industrial enterprise and commercial enterprises, it's one of the most important part of logistics. Timely delivery is a direct impact on customer satisfaction, therefor, how to response to market demand rapidly is an urgent problem in the logistics areas. Among them, vehicle scheduling is one of the most important factors of transportation service quality and cost. Scientific vehicle scheduling can improve the delivery speed, improve service levels, reduce distribution costs and increase social and economic benefits.

By studying the logistics transportation problem and optimization of vehicle dispatching, we proposed strategy of vehicle alliance for transportation tasks and resources in certain area. Based on Computer Network and communications equipment, transport enterprises can carry on the complementary advantages, coordinated cooperation with the aid of the strong support of information systems. Thus, some transport service that a single firm can't complete efficiently with less resource could cooperate with division of labor to realize optimization of logistics services.

THE NECESSITY OF TRANSPORT UNION

With the continuous development of manufacturing industry and the rapid growth of e-commerce, logistics industry also got rapid development, logistics enterprise service level increases. However, in general, the logistics enterprises is still unable to get rid of the situation of large quantity, small scale, low degree of specialization, low load factors and high empty loading rate. In addition, in order to meet consumer demand and respond to the market quickly, many companies tend to order with small quantity and multi batch. In this background, in order to achieve high load factors and low empty loading rate, the logistics transportation enterprises need to integrate logistics resources, transportation tasks, and resources sharing between enterprises to be a transport union and achieve economies of scale and reduce the transportation cost to achieve a win-win situation.

Transportation Enterprise Quantity and Scale

According to the survey and statistics of key industry, wholesale and retail enterprises' logistics situation from the national development and reform commission, the national bureau of statistics, and the China federation of logistics and purchasing, the number of logistics company is 543, accounting for 51% in logistics industry, and the whole service level is low, industry needs to be integrated as soon as possible.

High Transportation Cost

According to a 2013 survey of logistics enterprises, transport costs accounted about 47.9% of the total logistics cost. As transport logistics costs the most, the optimization of transportation is the key to reduce logistics costs and improve logistics efficiency.

The Trend of Specialization

In recent years, the influence of specialization has become increasingly deepened, companies pay more attention to improve their core competitiveness. More and more enterprises outsource the non-core business to the third party logistics providers to low the logistics costs, level up customer satisfaction, enhance enterprise's competitive ability. Therefor transport enterprises ought to seize the chance to meet the demands of industry enterprise commercial enterprise and create more value.

The Uncoordinated Capacity and Arrangement

The logistics enterprises are small and scattered currently, and the competition is fierce. the survey about the 2013 national average profit margin of logistics enterprises showed that the road

transportation enterprise's profit margin is only 5.1%.The main reason lies in the failure of transportation enterprise to form a transportation network, and the capacity and arrangement did not coordinate, which led the low rate of transport enterprises vehicle utilization. Setting up transportation alliance can build up transportation network quickly, and can also reduce the transportation cost effectively, improve enterprise competitiveness, expand business ability.

THE TYPE OF TRANSPORT UNION

According to the direction of the transport enterprise cooperation in transportation chain, alliance of transportation can be divided into two categories: vertical alliance and horizontal alliance.

Vertical Alliance

Vertical alliance covers two aspects: One is the combination of different transportation ways in the transport chain, such as road transport, rail transport, air transport, water transportation. vertical alliance combine transportation of each link well, that makes transport enterprises play their advantages respectively to realize professional transportation, traffic stabilization and the maximization of profits. Then the other one is to make the supplier put goods on the market accurately. Supplier can meet the needs of the downstream enterprises, at the same time can reduce the waste of resources. And forecasting the supply information and sales data, then complete the transportation task in the perspective of supply chain. Transportation scheduling based on supply chain is shown in the diagram below.
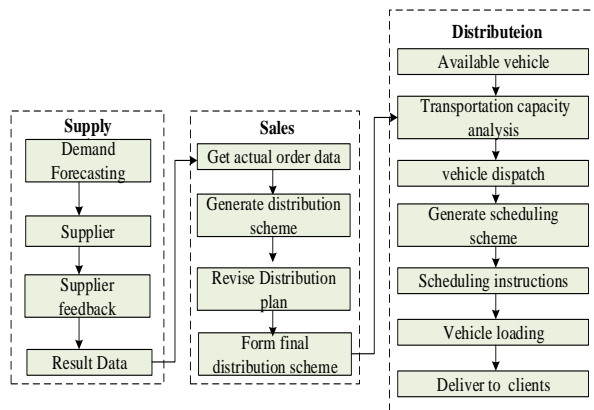

Figure 1. Transportation scheduling process

Logistics scheduling, monitoring and service platform driven by the business of transportation companies should be a perfect application platform that consider the whole supply chain, and research the general integration platform based on the whole process to make effective organization of data acquisition and transmission, sales forecast and plan and real-time delivery, production and marketing

cohesion, logistics scheduling information in the whole process.

Horizontal Alliance

Horizontal alliance is to cooperate between the same type of transport enterprises in the transport chain. Such as in order to achieve the benefit maximization, a few road transport enterprises choose to carpool to improve the utilization rate of vehicles, avoid flying empty, and when their own insufficiency, part of the transport business can be entrusted to the same industry of transportation enterprise. The goal of horizontal alliance is to reduce the risk of management, allocate transport resources rationally, meet customer demand timely, reduce operating costs, improve the transportation vehicle service level of the enterprise.

STRUCTURE OF TRANSPORT UNION SYSTEMS

Organization Structure

Transport union is two or more than two companies cooperate to complete the transportation task. In order to achieve perfect affect, they share transport task in the information sharing platform which can divide task again after the integration of the transportation task. Companies can combine task with its own resource usage to reach the best use of vehicles to realize the transfer of cargo space position. Transport union can be the combination of different modes of transportation, but also the same in different location of the relay on the mode of transportation. As shown in the figure below is the organization structure of transport union.
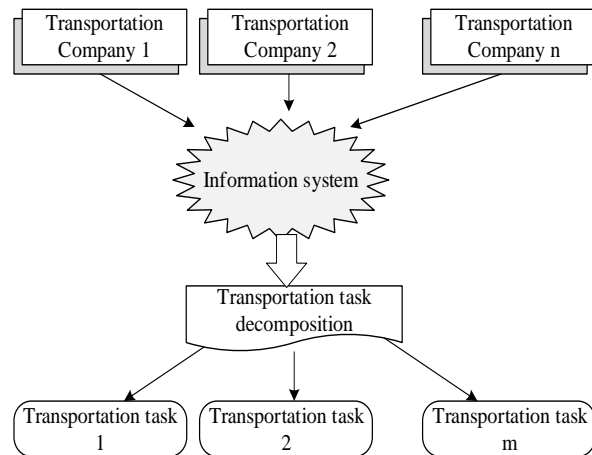

Figure 2. Transportation organization structure

With the help of information system support and computer network, companies in transport union take advantages from others, coordinated cooperation between alliance enterprises. By this way, transport service that a single enterprise is difficult to efficiently complete can be collected by information platform and be redistribution to each enterprises to achieve optimal transportation.

The System Structure and Process

Transport union system is based on information system, the cooperative enterprises are the platform users and all of the transportation tasks and resources

resources and tasks reasonably. The transportation tasks of collection are divided to better small tasks to be finished by several enterprises to make the utilization rate of resources to achieve the highest and minimize transportation costs. According to their own need, transport enterprises undertake the transportation tasks and then dispatch transportation vehicles to load goods, sent to the destination, and connect with customer. If the goods transportation is

are shared in the logistics information platform. At the same time, the information system of the scheduling management module dispatches transportation

accord to the requirements of the customer, the transport task is finished, but if not, companies need to analysis the reason, we need to feedback to the client if the responsible party is transportation, and negotiate with customer to resolve the problem if the responsible party in the shipper to ensure customer satisfaction. The structure of transport union systems and process is shown in the figure bellow.
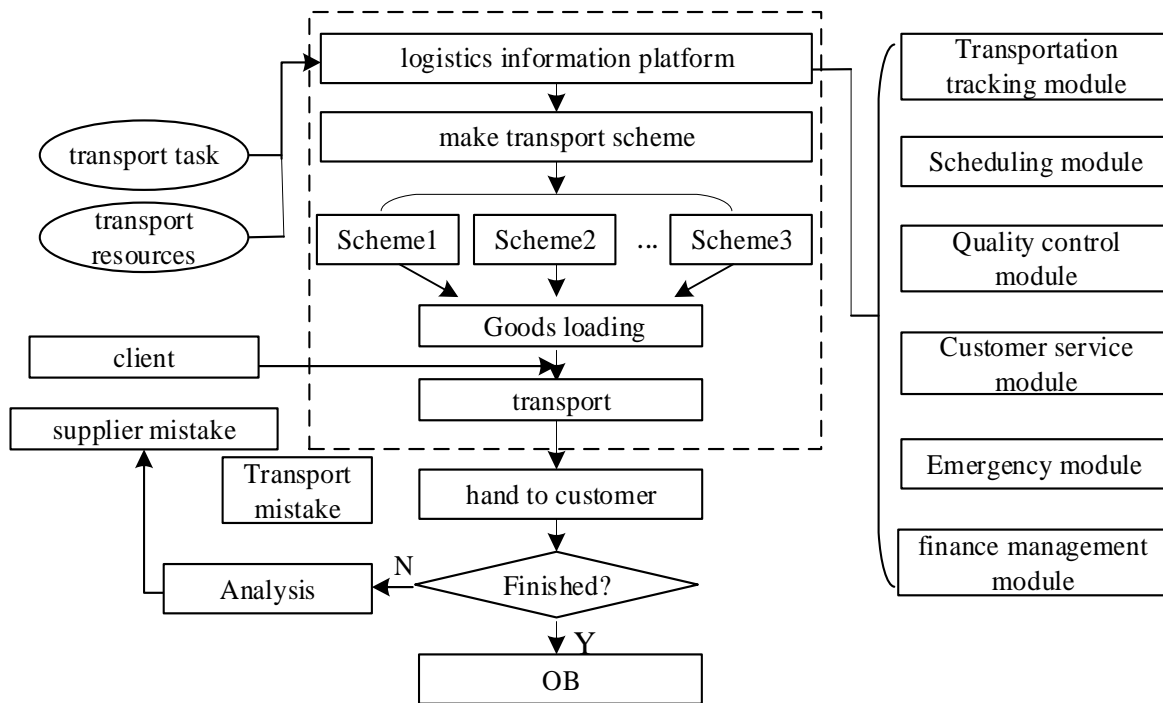

Figure 3. Structure of transport union systems

What's important is to monitor the vehicle's location, guarantee goods are in according to the properties of the transportation to ensure the safety of goods in the whole operation. In addition, building up customer service module to provide search and problems feedback functions to improve service quality; Establishing emergency system to handle the emergencies in a timely manner; Setting up financial settlement system to distribution income among enterprises reasonably.

TRANSPORT UNION BENEFIT ANALYSIS BASED ON COURNOT MODEL

To obtain economic interests is the main business of transportation enterprise target, and through transport union, transport enterprises establish a certain relationship that can largely reduce the overall cost, make the transportation enterprise wider

interests. This paper is on the basis of Cournot model, and through the analysis of the economic benefits of transport enterprises' benefit before and after the cooperation to research the alliance.

First of all, we choose two similar business companies on the market, A and B, respectively, the details is shown below:

(1) The logistics amount of A and B are q_1 and q_2 respectively, and the total logistics amount is Q, $Q = q_1 + q_2$;

(2) A and B are in the same market, and the enterprise service levels are totally the same, so the unit transportation cost and price are also the same, P, C respectively;

(3) The profit of enterprise A is L_1, and B is L_2;

(4) In the Cournot model, the functional relationship between price and logistics amount is P=k-Q.

Independent Operation Efficiency

According to the enterprise owned in the transportation resources and ability to operate independently,

$$L_1 = (P - C)q_1$$
$$L_2 = (P - C)q_2$$

And the profits are:

$$L_1 = [k - (q_1 + q_2) - C]q_1,$$

$q_1 = q_2 = \frac{1}{3}(k - C), L_1 = L_2 = \frac{1}{9}(k + C)^2$, and the gross profit of A and B is

$L = L_1 + L_2 = \frac{2}{9}(k - C)^2.$

Transport Union Efficiency

By setting up transportation alliance, companies will share the transport resources and combine them, and redistribution task through the transport union system. Then the gross profit of A and B is

$L_0 = Q(k - Q) - CQ$

and in order to realize maximized profits, $L_0' = 0$,

$Q = \frac{1}{2}(k - C)$, $L_0 = \frac{1}{4}(k - C)^2$.

Based on the above analysis, the resource that enterprise can save through the establishment of the transport union is $\Delta Q = q_1 + q_2 - Q == \frac{1}{6}(k - C)$; and the increased income is

$$\Delta L = L_0 - L = \frac{1}{36}(k - C)^2$$

CONCLUSION

This paper studies transport union based on the information system. By building transport union system, enterprises can integrate the resources of the transportation market, make companies form better competition relationship, expand the size of the enterprise as a whole to achieve scale effect of transportation.

After building a union at the same time, enterprises can realize the vehicle scheduling and tracking monitoring to manage transportation better and improve the quality of the transportation.

$$L_2 = [k - (q_1 + q_2) - C]q_2$$

According to the Nash equilibrium, logistics amount decision models need to satisfy the maximized profits.

$$L_1' = k - (q_1 + q_2) - q_1 - C = 0$$
$$L_2' = k - (q_1 + q_2) - q_2 - C = 0$$

In a competitive environment, by establishing the alliance between each transportation enterprise, not only can increase the common interests, also can save resources, to realize green logistics.

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