

ON THE TASK ASSIGNMENT AND MANAGEMENT MODE OF RAILWAY NETWORK CONTAINER FREIGHT STATION

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Abstract: According to the business functions and relevant operation characteristics of railway network container freight station (RNCFS), RNCFS' operation departments can be divided into 7 departments: Sales department, Inspection Department at the Gate, Management Department of Container Business, Dispatching Department, Loading and Unloading Department, Cleaning, Repairing and Maintaining Department, Shunting and Train Inspection Department, and tasks of each department are brought forward. Furthermore, in terms of whether each department's tasks are undertaken by the responsible institution of RNCFS or not, two kinds of RNCFS' basic management modes, namely, modes of self-operation business and outsourced business, are presented, the advantages and deficiencies of these two kinds of modes are analyzed and compared. Besides, RNCFS' management mode that should be adopted is made sure here on the basis of the development demands of China railway container transportation and the advanced experience in the world.

Key Words: Railway container freight station (RCFS), Function, Operation management, Mode

1. INTRODUCTION

China railway started to handle container transportation early in 1995, which was the first transportation way of handling the container transportation in China, but its development speed falls far behind water and highway container transportation. For example, the amount of

railway container transportation was 3,160,000TEU in 2003, which is fewer than 7% of the national port throughput (China railway container transportation situation in 2003, <http://www.jctrans.com/library/bqtc1.asp?id=5650&sel=11>). Since 1996, the average annual increasing rate of the railway container transportation has kept more than 12%, however, facing the serious competition between the domestic and international markets of container transportation, the transportation enterprises of railway bear tremendous pressure that their possessed market share is nibbled and crushed by other transportation enterprises, such as the highway transportation enterprises, water transportation enterprises, etc.. In this situation, China railway has adopted a series of reforming policies and has made several development plans concerned container transportation. Moreover, China railway container transport Co., Ltd. (CRCTC) has been established at the end of 2003, which is under the jurisdiction of Ministry of Railways and completely responsible for the specialized management and administration of railway container transportation in China. At present, CRCTC has 14 branches like Beijing, Harbin, Shenyang, etc. and 6 container freight stations such as Beijing East, Yangpu (in Shanghai), Chengdu East, Chongqing East, Dalang(in Guangzhou) and Kunming East, while some other railway container freight stations which are about 600 all over the country still belong to different railway bureaus respectively. According to the relevant railway container transportation development plans of Chinese Ministry of Railways, during a certain period in the near future, relevant technologies and measures of management and administration will be adopted (for example, developing double-stack container transportation in a more cost-effective manner, starting the double-stack container trains on main lines before 2007, such as railway of Beijing-Shanghai, Long-hai, Shanghai-Hangzhou, Jiangxi-Zhejiang, Jiaozhou-Jinan, Beijing-Kowloon, etc.). In addition to continuously exerting and consolidating the railway's advantages and leading position in the domestic container transportation market, China also adjusts overall configuration of railway container stations, and sets up 18 railway network container freight stations (RNCFS') of international advanced level and about 40 container freight stations near the provincial capital, large-scale ports and main inland ports as well. The construction plans of these 18 RNCFS are listed in Medium and Long-term Development Plan of Railway Network which are approved by State Council of China at the beginning of 2004.

As the freight trends of containerized and centralization, RNCFS is developed from the general railway freight stations providing container service under the condition that China railway has been developing the container transportation in a more cost-effective manner. RNCFS is a networked railway container freight station(RCFS) which handles the reception-departure of container trains, junction terminal transfer trains and loading-unloading of the whole container trains in specialty. It is a new type of specialized RCFS that concentrates on providing the container service. Furthermore, it has a large number of tasks, high information-based degree, advanced machines of loading-unloading, advanced management mechanism and the stronger radiate function of container transportation to surrounding areas. The first RNCFS has already broken ground to build in Kunming in July of 2004 (To construct railway network container freight station in Kunming can benefit the southwest a lot, http://www.yunnan.cn/1878/2004/07/21/210_@149386.htm). Moreover, the

relevant work about the preparation and designs of other 17 RNCFS(in Beijing, Shanghai, Guangzhou, Tianjin, Harbin, Shenyang, Dalian, Qingdao, Zhengzhou, Wuhan, Shenzhen, Ningbo, Chengdu, Chongqing, Kunming, Xi'an, Lanzhou and Urumchi) starts in succession. It is estimated that these 18 RNCFS' will undertake more than 50% of the reception-departure task of the national railway containers traffic volume after all of them are set up. It will form a collecting-scattering centre of the railway container based on RNCFS through developing a transportation organizational form of running container trains in opposite directions between every two RNCFS'. Based on container trains which are the most competitive products, RNCFS will join the railway container transportation systems of the goods collecting-scattering centre in every large Chinese economic area and main port, which will thoroughly change the current passive situation that it is difficult to organize intensive and fast container trains on each main line caused by the fragmentary and scattered overall configuration of container freight stations and the backward technological facilities. They can promote the transit of an extensive management type to an intensive one and realize the leap-type development strategy in the railway container transportation. Meanwhile, the constructing and starting of RNCFS' will greatly improve the operational efficiency of inland collecting-scattering system and accelerate the development of multimodal container transportation combined by railway, highway, inland-river and sea.

At present, major work (such as the work of loading-unloading and storage etc., which are inside the station during the course of container entering and setting off) in RCFS is in the charge of the affiliated railway bureaus or the stations' department of loading-unloading and freight transportation department. The work in the station is implemented as the integrated operation that is taken on by the railway. While only in a few RCFS' that are constructed by social enterprises and railway, the work of loading-unloading is undertaken by transport enterprises which are not affiliated to railway bureaus. However, the cases are on the contrary in railway container freight station of America, Canada, etc. (Tian, 2000). There are a large number of enterprises entering and operating in the container station. After specialized task assignment, the major work of container station, such as loading-unloading, storage, etc., are consigned to relevant enterprises. 18 RNCFS' above-mentioned will become the core assets of CRCTC and the main places engaged in container transportation to the outside. CRCTC will manage them directly. For the reason that there are remarkable differences in the required function, technical equipment and transporting management, etc. between the RNCFS and current RCFS, they must analyze and compare the task assignment and the management mode according to the requests of modernization management of RNCFS, thus making sure the mode suitable for the development demand of container transportation of China railway and ensuring RNCFS' work efficiency in all aspects after being put into operation.

2. MAIN BUSINESS FUNCTIONS OF RNCFS

According to geographical position and the structure of transporting amount, RNCFS can be classified into a inland-type RNCFS and a port-type RNCFS (Li, 2004). One inland-type

RNCFS is located in the areas of inland railway terminals. It provides service mainly for the industrial areas, developing zones and various kinds of logistics bases that lie in the city of railway terminals. Its customer groups are relatively scattering. One port-type RNCFS is located in coastal port cities. Besides handling the reception-departure of container in locality, it also handles plentiful tasks of transshipment for containers that are delivered through railway-sea combined transport. Its customer groups are relatively centralized. But no matter it is a inland-type RNCFS or a port-type RNCFS, its main business functions (Huang, 2003) should include five aspects as following:

1) RNCFS must have the collecting-scattering function of handling the reception-departure of container trains and junction terminal transfer trains.

Container trains run in the opposite directions between every two RNCFS'. They should handle the arrival and middle-transfer operation of container vehicles coming through the junction terminal transfer trains, which require RNCFS of having the throughput capability of fast handling the whole container trains' reception-departure, including loading and unloading ability, stacking ability in the container yard and short-distance carrying ability etc..

2) RNCFS should have the function of connecting multimodal container transportation.

The advantage of container transportation lies in developing multimodal transportation conveniently. RNCFS must offer technical supporting platform for multimodal container transportation in various kinds of facilities and job managements, thus the container transportation can be connected smoothly in many kinds of transportation ways, such as railway, highway and water transport, etc.. Also, RNCFS must offer "door to door" service of container transportation mainly by the highway-railway-highway combined transport.

3) RNCFS should have the business function of joint inspection of imported and exported international containers.

RNCFS' throughput is immense. Imported and exported international containers will take up a certain proportion among various kinds of receiving and departing containers (under the trend of global economic integration, this proportion will keep the relatively steady after rising to certain level gradually). In order to offer swift and convenient service of importing and exporting clearance for customers, RNCFS should set up executive office for customs, quarantine and inspection department inside the station and offer necessary places for customs to launch relevant businesses (for example, the area of customs supervise office, the operation area of quarantine and inspection department, etc.), which can help customs supervise the transfer containers or handle "custom clearance" formality (turning in documents, sampling, examination, release, etc.) for imported and exported container goods on the spot inside the station.

4) RNCFS should have the function of daily stacking, storing, maintenance and clearance for containers.

According to their designed throughput, RNCFS should have necessary yard for stacking empty and heavy containers, which could stack and preserve general containers and

containers which have special disposal requirements (such as the district for fridge containers). RNCFS should equip with facilities of washing, disinfecting and suffocating which can clean the unclear containers, such as the polluted containers or the container with peculiar smell, etc. Besides, RNCFS should have the checking function of whether the containers' technological state is normal or abnormal and the function of repairing containers temporarily.

5) RNCFS should have the information processing and transmitting function of terminals' container transportation.

RNCFS should set up the management information system which regards computer-management as the centre and realizes the resource-sharing of container transportation information in the range of railway network. RNCFS should implement dynamic management to containers inside the station and scouting management to containers setting off from the station so as to make the information processing convenient, such as the information processing of dispatching, exchanging, loading and unloading, allocating and sending out, storing and stacking, sending to be repaired and cleaned. They should make classified predictions according to the information of their container goods of receiving and dispatching, so that it can make relevant statistical analysis and confirm the recoverable amount of different containers in each RNCFS. They should keep unobstructed information processing and transmitting with relevant authoritative institutions and market customers. Besides, they should keep exchanging relevant information through computer network with relevant departments such as customs, quarantine and inspection department, port, bank, insurance institution, etc.

3. THE DESIGN OF RNCFS' OPERATION DEPARTMENTS AND TASK ASSIGNMENT

In order to assure the realizing of RNCFS' functions above-mentioned, they refer to task assignment and management mode of international stations and ports which are equipped with the advanced information technology and facilities. According to the classification and the content of tasks of RNCFS which are related to RNCFS' necessary functions, RNCFS' operation departments are set up and classified into 7 departments (Huang, 2004): Sales Department, Inspection Department at the Gate, Management Department of Container Business, Dispatching Department, Loading and Unloading Department, Cleaning, Repairing and Maintaining Department, Shunting and Train Inspection Department. The task contents of each department are as followings:

1) Sales Department

The Sales Department includes the opening business windows of railway container transportation in RNCFS and surrounding areas. It is mainly responsible for dealing with consignment and drawing of railway containers, expenses liquidation, documentation, granting seals and offering services of transporting consultation, etc..(Customers may inquire containers' real-time trends, the general knowledge and requirement about handling container

transportation through the inquiring system Website). Expenses collecting system reads data from RNCFS' container transportation administrative system so that it can turn relevant documents into collecting fees automatically, or transfer accounts automatically according to RNCFS and customer's contracts.

2) Inspection Department at the Gate

It is mainly responsible for checking and exchanging the passing containers for in and out, weighing passing containers, exchanging their bills at the RNCFS' gate. In the aspects of technology, it adopts the electronic floodgate(with a video recording) to automatically discern container trucks' license plate number, container No., take pictures for containers (The pictures will be put on record as the historical materials, in case they are needed sometimes.), scan and input the data of license plate number , container No., etc. Higher accuracy electron platform at the gate weighs the container trucks, so that the system automatically obtains the gross weight of the containers and provides the information of whether it is overloading or not.

3) Management Department of Container Business

It is responsible for the storing, looking after and management of ingoing containers, checking the bodies and the seals of containers that are stacked in the yard, dealing with the accidents of container freight, collecting and rearranging the bills, and transacting exchange with the receipting-departing container trains as well. In container yard, it should have the supervise or guide right to the daily work quality of loading and unloading department etc.. In the aspects of technology, it mainly depends on closed-circuit TV to control and check the dynamic state of containers. Besides, it obtains the inspection and operation information through handheld terminals or terminals fixed on vehicles on the work field, then it uploads the information of the result to RNCFS' dispatching department through wireless network.

4) Dispatching Department

It is responsible for setting up and assigning the plan of breaking-up reception trains, train formation plan for departing trains, the plan of matching weight for containers, and the plan of loading and unloading containers. It is also responsible for the plan of stacking, rearrangement, sending to be repaired and cleaned in each district of container yard. Besides, it is responsible for collecting and accounting information, coordinating the connection and cooperation between every department in RNCFS. And it is responsible for organizing relevant work about loading and unloading imported-exported international containers according to the requirement of customs, quarantine and inspection department, etc.. In the aspects of technology, RNCFS' dispatching system must offer the most optimized arrangement schedule relying on advanced management thought, mathematics model and theory of Operations Research. In case of inducing inferior optimization, operation staff in the Dispatching Department should assign guidelines according to its output results and reduce the artificial random intervention or alteration as possible.

5) Loading and Unloading Department

It executes the schedule of loading and unloading and feeds back relevant information. It is responsible for loading and unloading for railway vehicles and container trucks. Besides, it is responsible for stacking and rearranging containers and the work of carrying caused by shifting containers' position in the yard. In the aspects of technology, loading and unloading are completed by various loading and unloading machines and trailers which receive the dispatching guidelines, then the operator of loading and unloading machines confirm it through the wireless terminals. The department realizes real-time communication between handheld terminals, terminals fixed on vehicles and RNCFS' computer information management system through the wireless network, and feeds back of the done containers' information of present location, actual weight (done by the electron facilities fixed on the hoist of loading and unloading machines), etc.

6) Cleaning, Repairing and Maintaining Department

It executes the plan of sending to be repaired and cleaned. It is responsible for sweeping, cleaning, disinfecting, temporary repair and standing repair of railway containers. It can offer the paid service of cleaning and repairing for self-provided containers authorized by the proprietors.

7) Shunting and Train Inspection Department

It executes the plan of breaking-off reception trains and the train formation plan of departing trains. It is responsible for operation of placing-in and taking-out of departing container vehicles, train formation, breaking-up of reception container trains, sending vehicles to loading and unloading tracks, inspecting reception and departing containers trains, etc..

Besides the departments above-mentioned, there are close relations between the operation of customs, quarantine and inspection department of railway ports which are located in RNCFS and the operation of stations' transportation. The connected relationship of each transport business departments inside the station, customs, quarantine and inspection department are: according to the examination requirement and the detailed releasing information of clearing customs to each batch of receiving or departing international containers from ports' customs, quarantine and inspection department, RNCFS' departments, such as dispatching department, etc., should implement every task of ingoing and outgoing according to general railway procedure of container. Besides, they must undertake the carrying caused by stacking, storage, disinfecting, fumigation of international containers that are in the customs supervised district and the loading and unloading of railway vehicles and container trucks if that is required by customs, quarantine and inspection department. Moreover, they should help customs, quarantine and inspection department deal with relevant transportation problems occurring in the course of container "custom clearance".

The figure about main exchange relations of information and data between RNCFS' departments and each department inside the station and relevant departments outside the station are illustrated as follows: (Figure 1.)

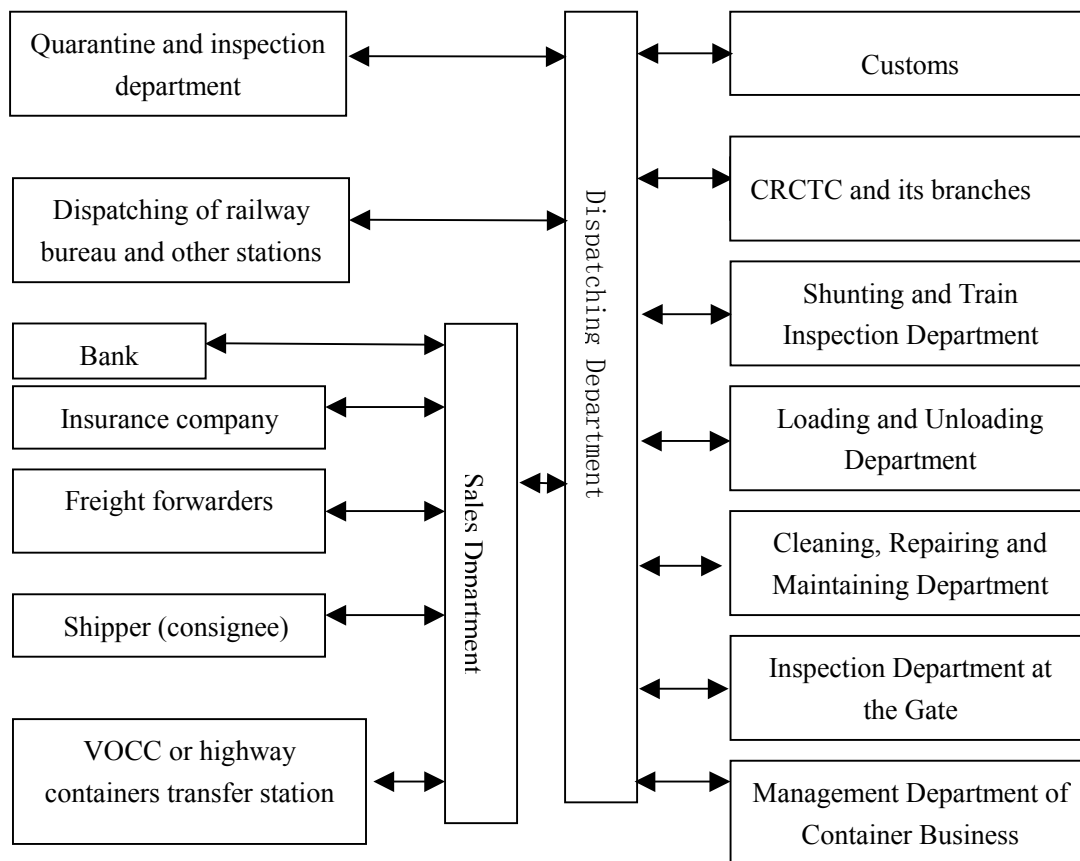


Figure1. The Relations of Exchanging Information between each Department of RNCFS and Relevant Departments outside the Station

4. THE RNCFS' OPERATION MANAGEMENT AND PERSONNEL POSITION SCHEME

RNFCS is a subordinate station which is managed by CRCTC directly. RNCFS' management mode can be divided into two in terms of whether CRCTC completely handles all tasks in RNCFS or not. These two kinds of modes have different advantages and deficiencies respectively.

4.1 Mode 1: All Tasks Are Completely Handled by CRCTC

Under this mode, they set up work position in terms of the function requirement of RNCFS' various departments. They ensure the workforce in terms of the technical equipment and workload of each position so as to ensure that the staff members keep certain working intensity within whole working time. Under this mode, RNCFS' personnel position and scheme are showed as follows:

- 1) Every Sales Department: there are two positions separately for consignment and consultation, settling accounts and documentation. The number of workers may be 2-3 in terms of the amount of business.
- 2) Every group of inspection at gate: there are double carriageways in terms of entrance and exit respectively, so 4 task groups in total at both sides of the entrance and the exit are set up. 2 people constitute a group, among which 1 person is responsible for inputting and checking information and printing transportation documents, the other is responsible for checking heavy containers at container trucks. There are 8 persons in total.
- 3) Every group of goods inspection: there are 3 persons in charge of exchanging documents, collection and rearrangement; 3 persons being responsible for spot, TV control, looking after and protecting special containers, and 3 persons undertaking task quality supervision and handling accident as well.
- 4) Every group of dispatching: there are 1 person for establishing and supervising the train formation plan and the schedule of breaking-off trains; 1 person for establishing and supervising the plan of loading and unloading containers, and 1 person for coordinating departments and statistical analysis.
- 5) The numbers of worker for container management, loading and unloading, shunting and train inspection, cleaning, repairing and maintaining depend on the station's workload.

Advantages of this mode are: CRCTC handles all businesses of the RNCFS. It has very strong controllability about RNCFS' staff, assets, facilities and every operation, which make the unified command and coordination and integrative operation conveniently in RNCFS. All computer systems of each department make up the LAN inside RNCFS, so that every department can share CRCTC' information platform and system conveniently. The information and documents between RNCFS' different departments can be exchanged relatively simple and convenient, and the other businesses are connected relatively simple and convenient too.

Deficiencies of this mode are: CRCTC must spend a large amount of financial resources on purchasing or leasing all necessary machines needed by every business (such as loading and unloading machines, shunting locomotive, etc.). Meanwhile, CRCTC must afford the expenses of staff' education and training, the expenses of staff' daily management and relevant expenses as well. RNCFS has many departments and its operation is widely involved in professional fields, while compared to specialized company, CRCTC does not possess the scale advantage and professional advantage in some businesses. These could result in common fault with the low efficiency of utilization of resources and too high operation cost by the fact that "small and comprehensive".

4.2 Mode 2: Tasks in the Station Are Partly Handled by CRCTC, While Others Are Outsourced

In RNCFS, the tasks handled by CRCTC are as follows: tasks of dispatching, sales department, inspection at the gate, management of container business in RNCFS. However, the tasks such as shunting and train inspection, loading and unloading, cleaning and repairing containers, etc. are outsourced or consigned to railway bureaus and specialized companies. These bureaus and specialized companies equip with relevant facilities and machines, while CRCTC only offers the usage right of relevant yard in terms of the RNCFS' configuration. The personnel position scheme of dispatching, sales department, inspection at gate and management of container business which are not outsourced could refer to mode 1, while the relevant companies are responsible for the personnel position scheme of outsourced businesses.

Advantages of this mode are: CRCTC can concentrate limited resources on developing main businesses. This mode make CRCTC realize the most optimum distribution of resources, reduce CRCTC' input in instruments, yard and human resources which are used for shunting and train inspection, loading and unloading, cleaning and repairing containers. CRCTC can concentrate limited manpower and financial resources on the key business of transportation. This mode saves expenses and increases profits for CRCTC. The third party logistics enterprises which are engaged in outsourced businesses utilize professional advantage and cost advantage of appropriate operation scale. They improve utilization ratio of every link's ability and realize saving expenses as well. Thus CRCTC can get benefits from the separating expenses, reduce the difficulty in enterprise management of CRCTC and promote its efficiency of management.

Deficiencies of this mode are: out-sourcing weakens the CRCTC' controllability of operation and management in container businesses. There are difficulties in documents exchange and other businesses' connections between CRCTC and contracting companies. In particular, the connections between CRCTC' department of dispatching and contracting companies are especially complicated and difficult. The CRCTC' management information system and platform are different from contracting companies', so the problems of information transmission and exchange between different systems and platforms must be solved. And how to guarantee the security of transmitting messages in the network becomes the problem that must be solved. Besides, they should put their heads together and nicely settle the knotty problem as follows: dividing responsibility in relevant businesses, handling accidents and making sure the method of expenses liquidation.

4.3 Recommending Adopted Mode

The layout on the whole way and construction of RNCFS is a huge project. At a rough estimate, the construction of 18 RNCFS' would take more than 15 billion RMB at least. If

mode 1 is adopted, the RNCFS' unified command and coordination is convenient, however, CRCTC should afford all funds for construction. Not only raising funds is very difficult, but also the unit operation cost in the future will be very high. However, if mode 2 is adopted, some corresponding profits of outsourced businesses may decrease, nevertheless, it can reduce the inputs in building funds of CRCTC greatly. Furthermore, it can reduce unit operation cost and dissolve relevant risks of operation. According to the development requests and actual conditions of China railway container transportation, referring to specialized and socialized successful experience and developing trends in task assignment that the foreign container stations and ports adopted, comparing the advantages and deficiencies between the above two modes synthetically, mode 2 should be the recommending adopted mode. If relevant conditions permitted, CRCTC can adjust mode 2 further. More businesses, such as inspection at gate, etc., can be put out to be managed and administered by other specialized companies.

In order to solve the problems that exist in mode 2, CRCTC must make tight contracts and institutions with the relevant business contracting enterprises on connections of RNCFS' operation links, responsibility division, accidents handling, expenses liquidation, etc., moreover, CRCTC should rigorously enforce them in operation in terms of contracts and relevant railway transportation rules and regulations. In additional, CRCTC should implement socialized and specialized operation in highway short-distance transportation of collecting and scattering containers outside the station which connects with the receiving and departing containers inside the RNCFS. The operation of dispatching necessary container trucks needed by transportation outside the station can be entrusted to the professional transportation companies that have relatively high service level in the society and can meet the operation requests of RNCFS by means of inviting public bidding, but not be taken on completely by the RNCFS.

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