The Analysis of the Motivation and Conditions of the "scattered change set" Cargo

Xiangru Meng*
Shandong Vocational University of Foreign Affairs, Weihai, Shandong Province, China, 264504;
*mxr6465201@126.com

Abstract. Economic progress and the invention of science and technology led to the vigorous development of the transport industry, promoting starch, soybean and other grain and coal and other bulk containers. Transportation can shorten the transportation time, guarantee the quality of goods and reduce the pollution to the environment. The transportation of "scattered change set" shows good development momentum and gradually scale expanded. This paper analyzes the motivation of "scattered change set ", studies the development of "scattered change set ", analyzes the condition of freight, and summarizes the inevitability of the development of "scattered change set ".

1. Introduction
The traditional dry bulk transportation not only causes damage to the human living environment, but also the high quality of the transport goods is difficult to maintain. In order to avoid the phenomenon of long transportation cycle and low transport safety in bulk cargo transportation, we should actively promote suitable ports and related enterprises to study new logistics models. The transportation mode is light, simple and difficult to operate, and can shorten the docking time and reduce the damage effectively[1].

Our country is beginning to draw lessons from the experience of carrying out "scattered change collection" transportation abroad, and carry out "scattered change collection" transportation reform in combination with the present situation of our country's transportation industry. It is necessary to deeply understand the situation of bulk shipping market, the trade of container shipping routes and the relevant encouraging policies of the state to the transportation industry. This paper analyzes and summarizes the motivation and conditions to promote the transportation of "scattered reform" in China. It is a trend to carry out the transportation of bulk goods, which has practical significance.

2. Analysis of the Motivation of "Bulk Change" Cargo Transport

2.1. Dry bulk shipping market volatility
On the international side, because of the input of new technology, the cost of dry bulk transportation in the international market changes, and then causes the fluctuation of shipping market, so the fluctuation of dry bulk transportation market has been very large. A rise and fall in the dry bulk index (BDI) in the baltic sea can derive global shipping changes, as shown in figure 1.
Figure 1. Global dry bulk seaborne volume growth and capacity growth, 2013-2019

The cost of dry bulk is low, which can offset some of the transportation cost. This is one of the factors that make the traditional dry bulk transportation difficult to cancel completely. Dry bulk goods account for a large proportion of the total cost in terms of transportation cost, and the proportion of transportation cost that the main body can offset with low cost is small, but the economic benefit of "scattered change collection" is very significant. For bulk shipping costs in 2018: the average price of coal on Australian-to-Chinese shipping routes is about US $47/ton, of which freight is US $10.7 per ton, or about 1/4 of the actual price; for packing shipping costs. For the packing shipping cost: the packing freight of iron ore is $2.7/ton, the calculated average value is $56.9/ton, about 1/21 of the actual price. Compared with bulk transport, container transport costs are significantly lower, the cost advantage is very prominent. The causes and reasons of the transportation include the fluctuation of the main body of the dry bulk market and the high transportation cost[2].

2.2. Uneven trade in container route
In the international shipping market, bulk dry bulk goods occupy a place. Dry bulk goods, bulk goods and other bulk goods are usually used as the carrier of irregular ships, and do not have their own fixed port and scheduled shipping time, rates. In the process of transportation, it is easy to cause the phenomenon of empty return box, which leads to the phenomenon of uneven flow of goods, and the transportation capacity. The development of container transportation and the investment expansion of transit outlets have made more bulk goods exported to Asian countries through containers in North America, South Korea and other countries, thus alleviating the imbalance of container import and export trade on routes.

Bulk carriers are gradually replaced by large container ships, large container ships have become a trend, single container transport costs are stable and low. In the future, the transportation will become the mainstream of the times, and its rising space is inestimable[3].

2.3. Bulk containerization has great potential
With the population growth, world trade, transportation and construction and other infrastructure construction and improvement, bulk transport demand will continue to expand, will also maintain a stable growth rate, which will greatly promote the development of dry bulk transport market. Steel consumption in 2018 is shown in Figure 2. From this we can see that the supply of goods is sufficient and the market potential is huge. To carry out the "scattered change collection" is greatly conducive to
greatly improve the container rate, and has a great prospect of the development of the transport market. In terms of demand, the bulk market demand is large. Bulk containerization is an inevitable trend and its potential can not be underestimated in the future. The cooperation of port enterprises and logistics enterprises in container transportation, the change of international situation, the research and development and application of new technology are all beneficial to the development of "scattered change collection ". At the same time, sufficient capacity conditions and reasonable transportation price will be the key factors in the development of "scattered transformation ".

![Figure 2. Apparent steel consumption in 2018](image)

In 2018, container shipping accounted for about 71% of the total shipping in developed countries, while the domestic ratio increased to about 36%, which shows that China still has sufficient potential in container shipping trade. Therefore, it is necessary to develop container market.

2.4. Efficient green transport development needs

The traditional low-efficiency production cost mode of bulk cargo transportation, the clean production mode of operation port and environmental protection technology are gradually eliminated, combined with the increasingly mature modern port, the gradual regulation of management and the influence on the application of new technology, the mode of transportation of "scattered change set" can be produced.

The transportation mode has many advantages, in storage, transportation, loading and unloading, site utilization has its own unique advantages. In terms of national development, this approach also responds to the current development needs of the country, mainly in reducing the labor intensity of workers, improving the working environment of workers, reducing carbon emissions and reducing environmental damage, and in line with the needs of national development and modern transportation.

Powder bulk goods can be transported by "bulk change" to increase their entry rate. For example: 4000 tons of coal is transported by ordinary trucks with a load of 50 tons. It is calculated that 80 trains will be transported to complete the transportation. But another "loose change" container transport mode only need 4 flights; A further calculation of the extent of environmental damage caused by bulk transport can be made of 40 tons of unusable coal if the transport is assumed to be 1 per cent; if the dust rate is 0.25 per cent, 100 kg of coal particles will cause serious damage to the environment.

3. Analysis on the Conditions of Transport of Goods with "Bulk Conversion"
Not all bulk goods can be transported in containers, in the implementation of "bulk change ", to consider its adaptation. It can be seen from the change of some ports in China that the exploration and
3.1. Adequate container capacity
In the short term, we want to alleviate the problems of port congestion, low smooth and low efficiency of bulk transportation system. About 22.04 million TEU in 2018 were the effective capacity of the world's crating vessels, resulting in an annual growth rate of 5.6 per cent year on year. Excess capacity is one of the main problems of packing freight. Global container ship capacity over the past five years is shown in Table 1.

| Year | Capacity size (TEU million) | Year-on-year growth (%) |
|------|-----------------------------|-------------------------|
| 2015 | 1984.9                      | 7.9                     |
| 2016 | 2009.8                      | 1.4                     |
| 2017 | 2086.8                      | 3.8                     |
| 2018 | 2203.7                      | 5.6                     |
| 2019 | 2270.6                      | 3.1                     |

The various types of ship rents have been reduced, as shown in tables 2 and 3 below, for the following reasons:
(1) Under the influence of the global economic changes, the international container transport market is under great pressure, which leads to the unbalanced supply of container ship capacity and the decline of its rental demand.
(2) Large ships are required for transport development. It is inevitable to eliminate small and medium-sized packing ships with small scale and poor economic benefits.

| Comparison Year | Average of China Export Container Rate Composite Index | Year-on-year growth rate (%) | Average of Shanghai Export Container Rate Composite Index | Year-on-year growth rate (%) |
|-----------------|--------------------------------------------------------|-----------------------------|---------------------------------------------------------|-----------------------------|
| 2016            | 710.7                                                  | -18.5                       | 650.1                                                   | -10.2                       |
| 2017            | 768.40                                                 | -2.1                        | 730.15                                                  | -5.5                        |
| 2018            | 817.38                                                 | -0.3                        | 835.33                                                  | 0.5                         |
| 2019            | 832                                                    | 1.76                        | 811                                                     | -3                          |

| Route            | 2018 Year-on-year growth rate (%) |
|------------------|-----------------------------------|
| China - Europe   | 1050.90 -3.1                      |
| China - Mediterranean | 1052.45 -2.6                  |
| China - USA West | 686.00 6.6                       |
| China - East America | 894.95 5.1                    |
| China - Australia | 837.10 17.4                     |
| China - South America | 634.96 15.7                 |

Emerging markets require efficient transport and adequate capacity, and the "decentralized" mode of transport is adapted to emerging markets. In terms of market environment, logistics companies can improve the efficiency of cargo transportation through effective and reasonable scheduling, ensure that the company can have sufficient capacity to ensure normal market operation, but also through planning to strive to improve the utilization rate of container transportation.

3.2. Packing Equipment
The transportation needs the corresponding equipment and operation process to maintain its operation. The innovative technology of "bulk change set" is to add the replacement link at the front or end of
bulk cargo transportation, that is, the bulk cargo is changed into container cargo at berth (ship) or
warehouse yard, so as to improve the generality and compatibility of ordinary containers. As shown in
Figure 3.

![Figure 3. Replacement link](image)

Traditional eight operating process flow, as shown in Table 4.

Table 4. The eight processes

| Mode of transport | Port Area Facilities | Water | Highway | Railway | Storage |
|-------------------|---------------------|-------|---------|---------|---------|
| berth             | Ship-boat (barge)   | Ship - Car | Ship - Train | Ship-yard |
| Library yard      | Field-Ship (barge)  | Field - car | Field - Train | Field - Field |

Table 4, take the railway transport ship-train as an example, to realize the bulk cargo containerized
"field-train" operation process, see Figure 4. The process is: First of all, the bulk should be unloaded
docked goods after the packing. Secondly, after the goods are properly stacked, the train is loaded
according to the standard operation requirements.

![Figure 4. Operational process flow](image)

Logistics special equipment in the container transport industry has been developing, in different
levels of their own independent application. The model of container transportation can reduce
environmental pollution, improve market competitiveness and avoid the disadvantages of traditional
bulk transportation. The development strategy of port transportation is to join special containers,
special cargo boxes and carry out maintenance business. The emergence of these special equipment
and technology has created the technical guarantee conditions for the development of bulk
containerization, and has become one of the adaptation conditions of "scattered change collection"[5].

The development of "scattered change set" can not be separated from the various adaptation
conditions created by many related enterprises, including loading and unloading process design ,
scattered change set "container intelligent station facilities and other measures. Improve and upgrade
the "scattered change set" transport function, develop low-carbon transport, increase container
throughput. The "scattered change set" requires a complete set of professional equipment and the
corresponding operation process to make the whole transportation process smooth.

3.3. Applicable cargo and routes
The transportation of bulk goods is different from that of traditional bulk goods transportation. The
development of "scattered change set" has made remarkable achievements, but this does not mean that
"scattered change set" this mode of transportation is suitable for all kinds of transportation. The
appropriate types of goods to be transported are shown in Table 5 below.
Table 5. Common "bulk set" adaptation species

| Category | Food          | Steel          | Chemicals                 | Other                  |
|----------|---------------|----------------|---------------------------|------------------------|
| Specific | Cereals and   | Ferrochrome    | Fertilizer, liquid         | Coal, phosphate        |
| cargo    | soybeans      | alloy          | chemicals, etc.           | rock, iron ore, etc.   |
| category |               |                |                           |                        |

The following problems should be considered when selecting the suitable goods and routes for transportation: adaptation, route, transportation damage, economic application, cost, pollution, etc. Only by studying and solving all kinds of problems can we ensure the smooth progress of "bulk-reform" freight transportation. For some routes and goods, in order to ensure a more stable route and economic benefits, "bulk" can be used in full container or container-bulk transport mode[6].

4. Conclusion

To sum up, it can be concluded that capacity, facilities, equipment, process conditions, goods, routes can affect the adaptability of "scattered change set". All kinds of factors will directly or indirectly affect the transportation process of "scattered change set". Nowadays, although the "scattered change set" cannot completely eliminate the traditional bulk transport mode, but with the continuous development of society, its potential and development in the future is unpredictable. In a word, the "scattered transformation" should become the mainstream of the current transportation industry, whether from the inherent advantages of transportation itself or from the requirements of national sustainable development. "scattered change set" is one of the best and most suitable modes of transport. The drawback of bulk transportation lies in the cost of managing the environment after it is transported, which will cause extra economic burden, which should be avoided and worth avoiding. It is a trend and a green alternative to the existing bulk transportation. So, in the future, the green and efficient mode of transportation will be widely spread around the world.

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