



Research on the Elements and System Framework of Modern Transportation Logistics

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Abstract. As a value-added activity in economic production, modern transportation and logistics is the product of the continuous development of socialized production and specialized division of labor. Its position and role in economic and social activities are becoming increasingly important. It not only plays a basic supporting role in economic and social development, but also works on leading and promoting the national and regional economy. It is an important application field of modern science and technology. Based on the understanding of modern logistics and transportation, this paper studies the connotation of modern traffic logistics deeply, defines the main body and elements of modern traffic logistics, proposes the framework of modern traffic logistics system. This research is of great significance for promoting the integrated development of transportation logistics and furthering the high-quality development of transportation logistics industry.

Keywords: Modern transportation logistics · elements · system framework

1 Introduction

Logistics industry is a complex service industry that integrates transportation, warehousing, freight forwarding, IT and other industries. As we all known, Transportation is the basic link and carrier of logistics and logistics promotes the development of transportation. They are closely related, organically integrated, synergistically linked and mutually promoted, and play a fundamental and strategic role in supporting and leading economic and social development. Transportation is an important sector of modern logistics and plays core function [1]. With the support of transportation, information and management technology, modern logistics industry is not only the expansion and reorganization of traditional transportation and related industries, but also a breakthrough of traditional industrial management ideas and a revolution of industrial operation mode [2]. The logistics cannot be achieved without transportation, but transportation alone cannot meet the needs of modern economic and social development, which is becoming increasingly complex and diversified. Then the integration of transportation and logistics has become the trend of future development.

According to the current research, domestic and foreign scholars have carried out some theoretical research on modern logistics and modern transportation. The study

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on the modern logistics includes the connotation, classification, components and technologies [3–5]. The study on the modern transportation contains the concept, features, components and technologies [6–8]. However, there are little researches on the modern transportation logistics system, that integrates the transportation and logistics together, and there are also few theories about the characteristics, components and technical framework of the modern transportation logistics system. Thus, this paper makes an in-depth study on the modern transportation logistics system.

2 Connotation Analysis

From the perspective of the development process, transportation preceded logistics. In some way logistics is evaluated from transportation. Logistics is the development and upgrade of transportation. Transportation is developed with the needs of human production and life, while logistics is an advanced management concept and management mode that becoming more and more mature with economic development and scientific and technological progress. It can be said that modern logistics is the advanced stage of the development of transport, and the development of modern transport logistics is the basis of logistics industry progressing. In this process, the transport is becoming more specialized, and the position of transport in the logistics industry gradually evolved from leading to supporting [9].

From the perspective of industry dimension, the broad concept of logistics covers transportation, which is not only an organic component of modern logistics, but also the most important subsystem in the logistics system. Transportation, with warehousing, handling, processing, distribution, constitutes the modern logistics industry by optimizing together. Transportation is also the core function of modern logistics. First, transportation realizes the spatial movement of goods, which is the most basic service function of logistics. Secondly, in the process of logistics, many other functions need to be completed with the help of transportation. Third, the transportation function realizes the mutual connection between other logistics functions to ensure the smooth completion of the whole logistics process. Fourth, transportation cost occupies the largest proportion in logistics cost.

From the perspective of industrial forms, transportation and modern logistics are both service industry categories, but modern logistics is a new type of service business, and transportation relatively belongs to the traditional industrial form. Modern logistics is a new form of service industry which includes various forms and types of business. It has the characteristics of modern technology and management organization, and covers transportation, storage, information, circulation and processing, packaging, handling, regional allocation and distribution, etc. As a traditional industry, transportation management theory and means have long lagged the development of infrastructures and equipment technologies in china. During the changing of traditional transportation to modernization, modern logistics concept has been fully promoted and applied in the field of transportation.

From the perspective of economic activities, logistics and transportation both realize the changes of spatial position of objects, but the process and effect of realizing are different. In the traditional sense, the main task of transportation is to complete the spatial

displacement of all kinds of materials produced in economic and social activities. This kind of displacement is mainly manifested as the large span in space and the discontinuity in time. Modern logistics is based on transportation technology and information technology, guided by system theory. On the premise of meeting the circulation demand, it pursues to reduce the total system cost of the whole process of service to the lowest level. Therefore, it can be said that modern logistics is an extension of the concept of transportation, is a revolutionary breakthrough to the traditional mode of transportation.

Modern transportation logistics system is essentially an organizational state of functional integration, which can be defined as: The modern transportation logistics system is based on the comprehensive transportation system as the carrier, supported by advanced technology, guided by aims of reducing cost, raising efficiency and improving quality. From the perspective of system, it realizes the lean matching between supply and demand, and supports economic developing rapidly, through whole-chain coordination, whole-area intelligence and full-time lean logistics and transportation services.

3 Methods and Materials

3.1 Characteristics of Modern Transportation Logistics System

Firstly, it's a kind of systematic concept. The modern transportation logistics focus on the coordination with economic, social, ecological environment, etc. and achieves the coexistence and development of economic systems, social systems and natural environment. In that way, the logistics and transportation activities are summarized as a system, with the concept of system, using the basic theory and basic methods of system engineering, optimizing the management problems and technical problems of each link to achieve win-win cooperation and enhance the overall competitiveness.

Secondly, it's applying lots of advanced technologies. The most significant feature of modern transportation logistics is the application of advanced technology represented by information technology, through the deep integration of advanced information technology, management technology and transportation technology to meet the increasingly large personalized logistics needs in production, circulation and consumption, and play an important role in promoting freight logistics to reduce costs, increase efficiency, improve quality and promote high-quality development.

Thirdly, it's a service value Embodiment. Modern transportation logistics is based on the integration and allocation of resources, with strong planning, purpose and controllability in the process of logistics and transportation, with more emphasis on user needs, and its value is mainly reflected in the realization of logistics services with minimum cost, maximum efficiency and optimal quality.

3.2 Elements of Modern Transportation Logistics System

The modern transportation logistics system is a composite and networked organizational state, which is mainly composed of three aspects: First, the network composed of modern transportation and logistics infrastructure. Second, the transport services formed by the market players based on the network. The third is the market environment formed

Table 1. Elements of modern transportation logistics system

Elements	Explanation
Rules and regulations	Including the field of modern transportation logistics laws, regulations, national standards, industry standards, local standards, industrial policies, industry service standards, integrity system and other content. Rules and regulations are the “soft constraints” of modern transportation and logistics system, maintaining the prerequisites for the healthy and orderly development of the system.
Market players	Including actual carriers, freight forwarders, freight inter-mediaries, terminal operators, third party logistics, supply chain enterprises and other market operators in the field of transportation logistics. Market players are the “living cells” of the modern transportation and logistics system, and the core elements to ensure the transformation of the system from old to new.
Technical equipment	It includes key technologies such as information technology and automation in the field of transportation logistics, vehicles, ships, machines, loading and unloading equipment and loading units. Technical equipment is the “main engine” of modern transportation logistics system, and the key factor to promote the overall transition of the system.
Infrastructure	Including roads, waterways, railways and other line network facilities, ports, railway freight stations, airports, logistics parks and other node facilities. Infrastructure is the “hard foundation” of modern transportation logistics system and the basic guarantee to support the efficient flow of system elements.

by integrity, standards, policies, regulations and other aspects. This study breaks the traditional composition perspective of element division and divides the modern transportation logistics system into four major elements from the three aspects of composite and networked organization status. Elements of modern transportation logistics system as shown in Table 1.

3.3 Framework of Modern Transportation Logistics System

The integrated development of transportation and logistics is an inevitable result of social and economic progress and an important representation of the full play of the efficiency of the comprehensive transportation network. In different stages, factors such as network resources, organizational formats and technology popularization have promoted the development and reform of transport logistics to varying degrees, affecting the value creation process and effectiveness of transport logistics. However, in general, the core value of transport logistics has not changed, and it is always more efficient to realize the value exchange of goods across time and space.

Therefore, transport logistics has the characteristics of a network industry, which is composed of four elements: Rules and regulations, market players, technical equipment

and infrastructure. It is an organization in which market players use technical equipment to complete the trans-time and space exchange of goods on the infrastructure network under the guidance and constraints of system and norms. According to the constituent elements and mutual relations, the modern transportation logistics system is subdivided into seven levels: infrastructure, equipment, transportation organization, technological innovation, market players, standards and norms, policies and regulations. Framework of modern transportation logistics system as shown in Fig. 1.

Infrastructure is the fundamental foundation of modern transportation logistics system. In the strategic layout of transportation infrastructure development in the new stage, it is necessary to gradually change the orientation from “accelerating construction” to “improving quality and efficiency”. Through the realization of quality reform, efficiency reform, power reform, promote the development of modern transport logistics infrastructure transformation and upgrading. Based on the overall judgment that the development of transport infrastructure has entered a new stage, the key to the development of modern transport logistics infrastructure is “synthesis” and “optimization”.

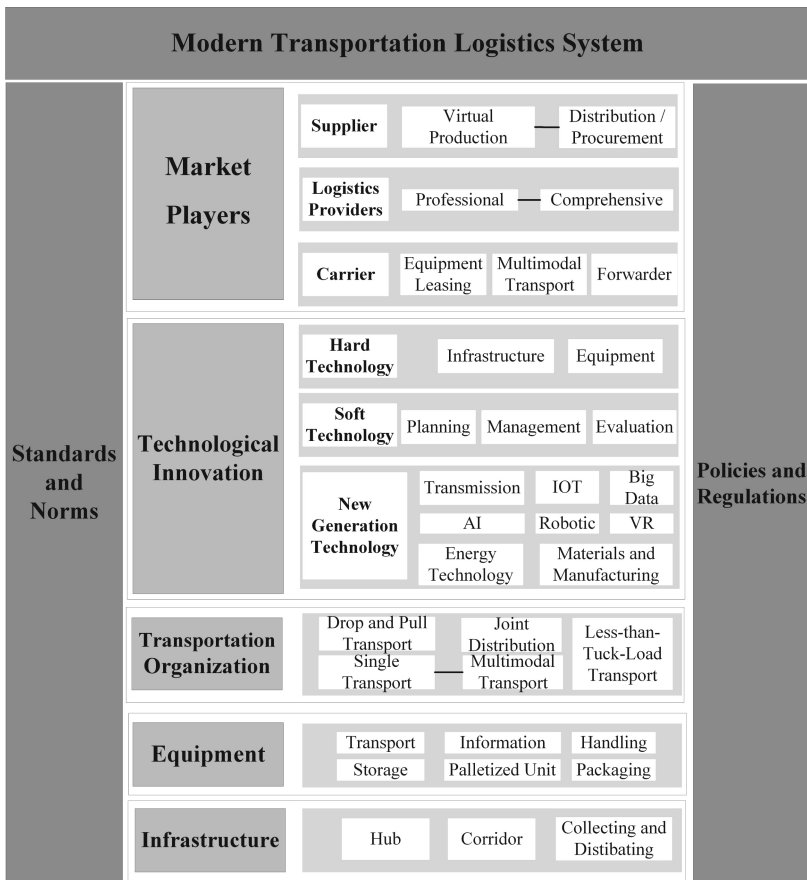


Fig. 1. Framework of modern transportation logistics system

Equipment matching with infrastructure is an important component of modern transportation logistics system. Modern transportation logistics with the development of the Internet of Things, the new generation of information technology represented by cloud computing, Internet of Things technology, intelligent sensing, big data mining technology is effectively integrated and applied to transportation equipment, storage equipment, loading and unloading equipment, information equipment, packaging units and sorting and packaging equipment, so that modern transportation logistics equipment presents a trend of intelligent, networked, collaborative.

Transportation organization is the key link of modern transportation logistics system. With the integrated development of transportation logistics, the marketization degree of transportation organization is getting higher and higher. Centering on serving the development of modern logistics and promoting the construction of comprehensive transport system, the road freight transport industry has focused on promoting the transformation and development of the industry from the aspects of innovating transport organization mode, perfecting industry standards and norms, accelerating the popularization and application of science and technology, optimizing the terminal distribution system, etc., which has achieved positive results and effectively supported the development of multimodal transport. In particular, the development of transportation organization methods has greatly improved the efficiency of logistics transportation.

Technological innovation is the driving force of modern transportation logistics system. Modern transportation logistics is an applied discipline. The essence of new technology is the comprehensive application of new technologies such as new generation information technology and new energy technology in the field of modern transportation logistics, which affects the layout planning of transportation tools and park hubs as well as the innovation of service mode and management mode, and forms new business forms and new modes. The rapid development of modern transportation logistics puts forward new requirements for technological innovation, especially in improving quality and efficiency. It is urgent to make breakthroughs through the application of new technologies.

Market players is the vitality source of modern transportation and logistics system. Supply chain service provider, logistics service provider and carrier are important components of modern transportation logistics system market. Service providers will gradually shift from single logistics service to integrated logistics service. Carriers will also shift from single sector to multimodal carriers. Modern transportation logistics system needs to cultivate logistics subjects with market vitality and enhance the market competitiveness of logistics enterprises. We will encourage transport logistics enterprises to optimize and integrate their resources through mergers and reorganizations, alliances and cooperation, cultivate a group of internationally competitive modern transport logistics enterprises, and enhance the integrated supply chain service capability.

Standards and norms are the foundation support of modern transportation logistics system. It is necessary to further improve the standard system of modern transport logistics, strengthen the guiding role of national standards and industrial standards in the field of transport logistics, encourage the formulation of group standards and enterprise standards from a high starting point, promote the integration of international and domestic transport logistics standards, and intensify the publicity and implementation of the

published transport logistics standards. To promote the optimization and upgrading of basic and general transportation logistics technical standards. Promote the transformation of transportation logistics scientific and technological achievements by improving standards. Establish a mechanism for the implementation and promotion of transport logistics standards that is promoted by the government and participated by industry associations and enterprises.

Policies and regulations are the important guarantee of modern transportation logistics system. During the “14th Five-Year Plan”, modern transportation logistics related policies and planning came out. Logistics aspect, the “14th Five-Year Plan of modern logistics development” was formally issued. This is the first five-year plan in the field of logistics in our country, marking that the Chinese logistics industry has entered a new stage of system integration, transformation development, and function improvement. In terms of laws and regulations, the framework of laws and regulations system of transport logistics should be adapted to the modern transport logistics system. According to the different social relations of various modes of transport in the transport logistics system, the corresponding laws and regulations system and the laws, administrative regulations and rules composed of the system should be determined, not only to avoid leaving a legislative blank, but also to avoid overlapping laws, administrative regulations and rules.

4 Conclusions

With the development of comprehensive transportation, the characteristics of network industry will inevitably promote the transportation network to integrate more related elements and resources, improve the comprehensiveness of transportation modes and the intensification of transportation organizations, and form an industrial ecology with comprehensive transportation network as the cornerstone, enterprises as the main body, organizational services as the core, technology and equipment as the means, and policy environment as the guarantee. Modern transportation logistics system is a new era logistics service system based on the inevitable trend of integrated development of transportation logistics, in accordance with the development concept of innovation, coordination, green, open and sharing, guided by improving quality, reducing cost and increasing efficiency, with modern comprehensive transportation system as the carrier, and in the form of whole-course, efficient and collaborative logistics organization chain. It is the main content of transportation power and the important support of modern economic system.

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