Impact Path on the Development of Railway Freight Transportation Services by Informatization Based on Sector Perspective

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Abstract. The effect of informatization and standardization on civil aviation, waterway transport and highway transport is analyzed respectively, which finds the informatization is embedded the freight standard. Information has played the important role in the improvement of the freight efficiency and service quality in three transport sectors. Learning from the above experience, some suggestions on informatization-driven quality improvement in railway freight transportation services are given below to promote the transformation of railways into a modern logistics system, to develop the mechanisms and systems that meet the requirements of market economy for railway transportation management, and to establish modern logistics enterprises.

1. Introduction
In recent years, China’s civil aviation freight transportation industry has developed rapidly. Although it only accounts for a small proportion of the overall volume of freight transportation, the scale of its operation shows a trend of rapid development. Informatization has become the important role in improving the quality of transportation service. The paper illustrate that informatization promote the quality improvement of civil aviation, waterway and road freight transportation, and give the informatization suggestion to develop railway freight transportation.

2. Practices of Quality Improvement in Civil Aviation Freight Transportation Services Driven by Standardization
In 2017, the volume of cargo and mail transportation in this industry reached 7.059 million tons, an increase of 5.6% over the previous year, occupying about 0.01% of the total volume. The freight turnover of this industry was 24.355 billion ton-kilometers, 9.8% above the previous year. A total of 24,781 consumer complaints about passenger and freight transportation services were received in the whole year, an increase of 5615 cases (29.3%) over the previous year. The quality of civil aviation freight transportation services has improved.

Informatization was strengthened in the management of civil aviation freight transportation to facilitate the regulation of service quality. The administrative department on civil aviation transportation took service quality standards as the basis for regulation. It enhanced IT-based development of civil aviation freight transportation by establishing and releasing service quality standards. It regulated civil aviation enterprises with effective information technologies and encouraged them to improve their service quality. It also urged them to increase information transparency and support better communication with consumers so as to protect consumers’ rights and
interests. The department released six standards for air transportation successively, which constituted a quality standard system for aviation freight transportation. The quality standard system covers terminology, transportation accident classification, service quality regulations, quality evaluation indicators, luggage transportation regulations, and airport service quality. Besides, it raised specific requirements for the key contents and elements of each part, especially for informatization.

In general, quality standards for civil aviation freight transportation services include the general requirements for the service quality of freight transportation, the requirements for organization establishment, the requirements for configuration of IT-based equipment and facilities, and the requirements for logistics in the whole process, service regulation and quality evaluation indicators. The measures adopted to promote informatization in enhancing the quality of civil aviation freight transportation services are mainly as follows:

2.1. IT-based equipment and facilities are fully configured.
Since customer experience is crucial in civil aviation freight transportation, IT-based equipment and facilities are fully configured. For example, it is required to provide different kinds of eye-catching customer service guides in service halls. These guides should be standard and correct and cover all kinds of possible issues. The public information contained should conform to relevant national standards. It is also required to set up IT-based supporting facilities in service halls for consignors to transfer goods and consignees to pick up goods conveniently.

2.2. IT-based time limitation management is strengthened in the whole process of civil aviation freight transportation.
In the stage of cargo collection, the waiting time at cargo collection areas and platforms should be no more than 20 minutes. Cargoes should be transported within three days through domestic trunk airlines or within seven days through domestic branch airlines while mails should be transported within 24 hours. In the stage of cargo loading and unloading, it should take no more than 60 minutes after ATA if aircrafts of C-level or lower levels are used and no more than 120 minutes after ATA if aircrafts above C-level are used. For urgent cargoes, fresh products and perishable goods, it should take no more than 90 minutes after ATA to start transportation. For express cargoes, it should take no more than 90 minutes after ATA to start transportation through international and regional flights and no more than 70 minutes after ATA to start transportation through domestic flights. For ordinary cargoes, it should take no more than 240 minutes to start transportation through international and regional flights and no more than 180 minutes to start transportation through domestic flights. The rate of timely bill of lading should be no less than 95%. In the stage of delivery, it should take no more than 30 minutes to pick up goods.

2.3. The management of after-sales services is driven by informatization.
Informatization is strengthened in after-sales services of civil aviation freight transportation. Such efforts include enabling consumers to search cargo information online and claim compensations for cargo losses online, satisfying their needs of information consulting.

3. IT-based Construction Urgently Needed to Enhance the Service Quality of Waterway Freight Transportation
China's waterway freight transportation takes up a certain proportion of the total volume of its freight transportation. In order to promote the quality and service standards for its waterway passenger and freight transportation, the Ministry of Transport in 2015 started a survey on the establishment of a quality and service standard system of waterway passenger and freight transportation. Based on the service quality of waterway freight transportation, it further improved the development quality and efficiency and enhanced the management and services of waterway passenger and freight transportation. It strengthened informatization by improving the quality and service standards for waterway passenger and freight transportation. It laid down the requirements for the processes and
results of a series of activities that port and shipping enterprises should meet when engaging with passengers and cargo owners.

Based on relevant standards and informatization for waterway transportation, the quality standards for waterway freight transportation services can be summarized as follows: the general requirements; the organization regulations that cover service staff, equipment and facilities, information sharing, and exception handling; the logistics regulations that deal with transport organizations, drayage, container yard operations, dock preparation, cargo loading and unloading, stowage, distribution, and delivery; and the service quality requirements that include indicators for transportation quality evaluation. When it comes to specific requirements for informatization, the standard titled Requirements on Services of Passenger Transport by Water points out that service information should be published through proper media and that the information should be true, complete and effective. The standard titled Specification of Water Transportation Service for Passenger Cars requires that information liaison should be guaranteed, which means that carriers shall keep in contact with consignors, shippers and consignees as scheduled.

Up to now, China has established national standards of quality requirements for its waterway passenger transportation but not for its waterway freight transportation. There is a lack of IT-based construction and management of waterway freight transportation. Besides, it has taken too much time to set up relevant standards for waterway freight transportation, which makes it impossible to satisfy its rapid development. Therefore, it is urgent to strengthen the construction of IT systems in the field of waterway freight transportation.

4. Practices of Quality Improvement in Road Freight Transportation Services Driven by Informatization

In recent years, China's road freight transportation industry has developed rapidly, which is closely related to the rapid growth of its economy and continuous improvement of its people's living standards. Besides, the service quality has steadily improved. China's road freight transportation has gained a relatively mature development and there are a lot of freight transportation standards. At present, the focus of road freight transportation is placed on the establishment of a service quality evaluation system and informatization. A set of systematic service quality standards have been set up to comprehensively evaluate the quality of freight transportation services from the perspectives of transportation quality, enterprise ratings and evaluation indicators.

Generally, quality standards for road freight transportation services include the general rules that deal with security issues, timely and correct transportation services; the organization regulations that deal with service staff, information services, customer relationships, transportation sites, equipment and facilities; the logistics requirements that cover service acceptance, transportation alteration, insurance and declared value coverage, freight scheduling, vehicle operation, cargo loading and unloading, and cargo delivery; and the service quality requirements that deal with service regulations and indicators for transportation quality evaluation.

Informatization has been actively promoted in the process of standardization of road freight transportation to realize a deep integration of the both. The quality standards for road freight transportation services raise up a lot of requirements for informatization, which has played an important role in improving the quality of freight transportation services.

4.1. information services are emphasized and the rate of electronic information is enhanced.

In aspect of information services, it is required to establish enterprise websites where basic information, such as company profiles, scope of business and contacts, is provided. These websites should have the functions of querying service fees and transportation capacity, submitting orders online, and querying the track of cargoes. It is also required to offer various forms of information query function and to guarantee timely and accurate information query. It is encouraged to offer multiple ways of service acceptance, such as through door-to-door services, letters, online services or phone calls. In aspect of freight scheduling, computer-aided scheduling and optimization systems
should be equipped to increase the efficiency. In aspect of service regulation, it is required to publish the phone numbers and URLs used to regulate service quality. In aspect of informatization evaluation and management, related indicators are proposed, such as the rate of placing electronic information online and the rate of computer penetration.

4.2. Freight transportation procedures are simplified and multiple ways of accepting information services are provided.
In aspect of service acceptance, it is required that carriers should accept transportation services and that different channels and ways of accepting information services should be made available. In aspect of evaluation indicators, it is suggested that two indicators should be adopted, namely, the rate of transportation with one ticket and the rate of simplified service acceptance, to optimize the behavior and service models of road freight transportation.

4.3. Informatization is promoted to guide self-services.
In aspect of freight transportation sites, it is required to offer places that are convenient for cargo owners to deliver and pick up cargoes. It is also required to provide favorable individual information services. It is required to provide IT-enabled equipment and facilities for cargo owners to pick up the cargoes personally. It is required to provide facilities which consignees and shippers can use to load and unload the cargoes themselves.

4.4. IT-based systems are established to manage and maintain customer relationships.
Customer information systems for road freight transportation have been established to better maintain customer relationships. Specific tasks are as follows: collecting and managing customer information carefully, adopting relevant commercial confidentiality measures to protect the managed customer information, actively providing personalized services for long-term and key customers, notifying customers of prices and transportation capacity regularly or at any moment, and communicating with customers when errors arise and correcting them in time. Besides, Informatization is strengthened for service regulation. Call centers are established to handle customers' feedback in time and call them back when necessary.

5. Important Revelations from Quality Improvement in Freight Transportation Services Driven by Informatization
Based on above analysis of quality improvements in civil aviation, waterway and road freight transportation services, important characteristics can be summarized as follows: With regard to civil aviation freight transportation, information technologies are adopted to establish the service quality evaluation indexes based on the quality standard system. The indexes are further divided into smaller modules including transportation equipment and facilities, cargo transportation services, and quality indicators for modular management and evaluation. With regard to waterway freight transportation, basic requirements have been developed. The focus is placed on the enhancement of transportation efficiency and service quality through informatization. It is suggested that information technologies should be used to regulate the industry, standardize transportation equipment and facilities, improve the quality of service staff, and protect customers' rights and interests according to the laws. When it comes to road freight transportation, the service quality evaluation system has been established. It is suggested that information technologies should be adopted to promote transportation quality evaluation, enterprise ratings and evaluation indicators. A set of systematic service quality standards have been set up to comprehensively evaluate the quality of freight transportation services.

Considering the current rapid development of China's freight transportation industry as well as the experience and inadequacy in informatization for civil aviation, road and waterway freight transportation services, the suggestions on informatization-driven quality improvement in railway freight transportation services are given below to promote the transformation of railways into a
modern logistics system, to develop the mechanisms and systems that meet the requirements of market economy for railway transportation management, and to establish modern logistics enterprises.

(1) In the era of big data, we are facing severe issues of information security. However, the security requirements in the general rules of service quality in the three industries are only limited to hardware security and security systems, which are designed to protect the safety of lives and cargoes. Only the service quality standards for road freight transportation has specified in the part of customer relationships that relevant commercial confidentiality measures should be adopted to protect the managed customer information. Thus, the general rules of the service quality standards for railway freight transportation can include the security of customer information as part of the security requirements. In view of the requirement of information disclosure in the service quality standards for waterway transportation, the general rules for railway freight transportation can also include the content of information disclosure. Since customer experience and efficient services are emphasized in the service quality of civil aviation transportation, and simplified procedures are also stressed in the service quality of road transportation, the general rules for railway freight transportation should include the content of convenience as well.

(2) A majority of cargo owners care about contracts and information liaison in the process of modern logistics. We should gain experience from road freight transportation and include service contracts as part of the standards to better guarantee railway freight transportation. Based on the principles of equality and mutual benefit, we should invigorate the agreement reached between consignors and carriers through consultation and establish an effective communication mechanism.

(3) In view of the regulations on information services and internet services in the quality standards for road freight transportation, against the great development of information technology and e-commerce, we should establish an electronic information service system for railway freight transportation and provide different ways of information services to satisfy customers' needs of information services.

(4) As time limitation is emphasized in the service quality of civil aviation transportation and specific standards are established for the waiting time of cargo collection, the time limitation for cargoes being shipped out, the time of shipping cargoes into warehouses, the time of issuing bills of lade, and the waiting time of cargo pickup, we should develop reasonable regulations on the time limitation for notification of cargo pickup, handling complaints and making compensations in the service quality standards for railway freight transportation in a bid to enhance the efficiency and customer satisfaction in railway freight transportation.

(5) As the service standards for road freight transportation require that different ways of information service acceptance and personalized information services should be provided, we should strengthen information services in railway freight transportation and develop regulations on providing various ways of service that are convenient to customers, especially for online service handling and query and door-to-door services. All of these efforts are meant to satisfy customers' multiple service requirements and enhance customer experience of freight transportation.

6. Conclusion
Based on the analysis of road, waterway and cargo freight transportation service, informatization has become the technological tool to promote the transportation facilities, which plays an important role in improving the service quality. Considering the social demand of railway freight transport, some suggestions are put forward to improve railway freight transport efficiency and service quality.

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