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Promoting New Business Forms and New Development Models of Logistics

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Abstract: Promoting the development of new business forms and new models of logistics is an important way to improve the industry organization and intensive level, lower the logistics service cost and stimulate new growth. This paper analyzes the needs for the logistics business innovation in several aspects: the industry performance in China, industrial structure, market structure, logistics business structure, and logistics development evolution trends as well as the new requirements for promoting the systematical innovation. Finally, the paper proposes the key development areas and strategies in the trunkline logistics organization, terminal logistics organization, logistics equipment recycling and sharing, network freight platform, and etc. **DOI:** 10.13813/j.cn11-5141/u.2021.0010-en

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Promoting innovation and evolvement in business forms, development models, and organization system of logistics is an important way to improve the industry organization and intensive level, reduce cost and increase benefit of logistics, and stimulate new growth. The Chinese Communist Party (CPC) Central Committee and the State Council has highlighted the great importance of the development of new business forms and new development models of logistics and identified them as a critical part in promoting transformation, upgrading, and high-quality development of the logistics industry. In September 2019, the CPC Central Committee and the State Council issued the “*Outline for Building a Country with Strong Transportation Power*”, which explicitly proposed to promote efficient “Internet+” logistics and accelerate the development of new business forms and new development models of logistics^[1]. In September 2020, the Eighth Meeting of the Chinese Central Finance and Economics Committee (CFEC) emphasized the need to speed up the development of new technologies, new business forms and new development models for circulation. Accelerating the development of new business forms and new development models of logistics is of great significance to enhance the vitality of the real economy as well as the comprehensive competitiveness of the regional and national economy.

1 Development of China’s logistics organization system

In 2013, China surpassed the United States for the first

time to have the largest logistics market scale in the world. In 2019, China’s national total logistics amount reached Renminbi (CNY) 298 trillion, with a year-over-year (YoY) increase of 5.9%; China’s total logistics revenue grew to CNY 1.03 billion, with a YoY increase of 9%. The logistics industry in China has been maintaining an overall stable growth^[2]. From 2010 to 2019, China’s logistics market scale expanded rapidly, with the total social logistics amount increasing by 8.4% on average (see Fig. 1).

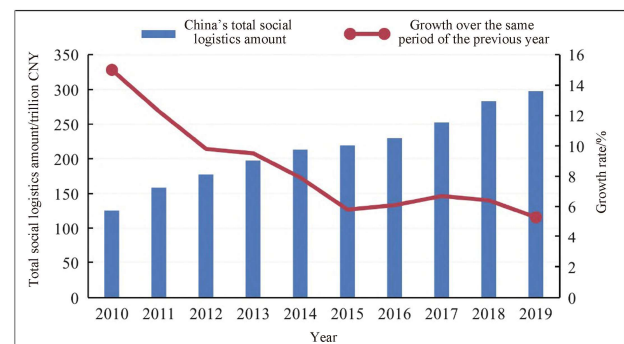


Fig. 1 China’s total social logistics from 2010 to 2019

Source: China’s Logistics Operation Report from 2010 to 2019.

1.1 Logistics performance

Despite a rapid development in recent years, the logistics industry in China still runs far behind those of developed countries in Europe and America in terms of the performance

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level, due to poor organization of logistics transportation and insufficient professional competence of logistics market players. Overall, the logistics industry in China has the following two characteristics:

1) High logistics cost. As shown in Tab. 1, China's national total logistics cost was CNY 14.6 trillion in 2019, with a YoY increase of 7.3%. Over the same period, the proportion of total logistics cost to GDP was 14.7%, which, despite a decrease of 3 percentage points than that of 10 years ago, was still 8%–10% higher than that of developed countries [2]. In particular, the management costs and storage costs have been constantly increasing.

Tab. 1 Composition and growth rate of China's total social logistics costs in 2019

Category	Absolute value/trillion CNY	YoY increase/%	Proportion to total social logistics costs/%	Proportion to GDP/%
Transportation cost	7.7	7.2	52.8	7.8
Storage cost	5.0	7.4	34.2	5.0
Management cost	1.9	7.0	13.0	1.9

Source: 2019 Report of China's Logistics Operation.

2) Poor operational performance. In 2018, China ranked No. 26 in the world in terms of logistics performance index (LPI) with a comprehensive score of 3.61. With regard to logistics service timeliness and logistics infrastructure level, the average LPI scores in the top 30 countries and regions were 4.11 and 3.86 respectively, which were much higher than 0.27 and 0.11 in China. These scores indicate that China still has substantially weak logistics service capability and transportation efficiency [3].

1.2 Logistics structure

From a macro perspective, the industrial structure may introduce structural contradiction in logistics demand. For example, the differences among various regions in resources reservation and industrial distribution demand cross-regional transportation of bulk materials, such as north-to-south movement of coal and south-to-north movement of vegetables. In China's industrial structure, heavy industry still accounts for a large proportion, which results in a large-scale logistics transportation per unit of GDP and forms an unreasonable logistics organization and circulation pattern. With increased industrial structure adjustment, the demand for bulk commodities featuring large traditional freight volume has declined and the associated supporting transportation capacity has been excessive. In recent years, the logistics demand structure has been further adjusted along with upgraded consumption and rapid development of online shopping business. On the one hand, the growth of logistics demand for bulk commodities such as steel, coal, and cement has slowed down. On the other hand, the demand for consumer logistics has been growing rapidly. China's traditional logistics organization system is still unable to adapt to the changes in the industrial logistics demand structure.

From a mesoscopic perspective, there is structural contradiction in the logistics industry. 1) Structural contradiction exists among transportation modes. On the one hand, the transportation structure is unreasonable; the medium and long-distance transportation of large quantities of coal and other bulk materials mainly depends on highways, thus resulting in a massive consumption of advantageous energy with increased transportation cost. On the other hand, the relatively lagging development of multimodal transportation, insufficient collection and distribution capacity, and poor connection among transportation modes result in substantial resource waste, with the conversion cost accounting for about 1/3 of the total cost. 2) There are structural weakness between trunkline transportation and urban distribution, insufficient integration between channels and nodes, and prominent "last-mile" bottleneck problem of urban terminal distribution. In particular, the problem of connection between trunkline transportation (featuring large-volume import and export) and urban distribution (characterized by small quantities and multiple batches) is significant. Statistics have shown that the cost of "last-mile" distribution is two times higher than that of trunkline transportation. 3) The structural contradiction also exists among links, with low level of integrated and standardized transportation and distribution, as well as low efficiency of transportation due to using old freight vehicles and tools. In particular, e-commerce logistics, involving transportation, warehousing, sorting, processing, distribution and other links of commodities, have experienced problems of unpacking, sorting, repeated and excessive packaging, etc.

From a micro perspective, structural contradiction of market exists in China's logistics industry. 1) The current self-support logistics in China still account for a large proportion, while the third-party logistics and supply chain remain immature. Specifically, the share of third-party logistics is less than 40%. Due to the small operation scale and limited integration, third-party logistics service providers cannot provide enterprises with complete supply chain services. 2) The vast majority of logistics enterprises are "small, scattered, and weak" with a lack of competitiveness. Few large-scale logistics enterprises really stand out as key leaders and they are still far behind those of developed countries in terms of profitability. 3) There are many problems of logistics, including slow development of advanced transportation organization modes, low operational efficiency, insufficient multimodal transportation and drop-and-pull transport, underdevelopment of network transportation, urban joint distribution, and overall extensive logistics organization by enterprises, low single-vehicle utilization efficiency, and particularly excessive unloaded transportation. The average actual load rate of China's freight vehicles is 1/3 lower than that of developed countries in Europe and America, while the average effective mileage of vehicles per day is only 1/2 of that in developed countries [4].

1.3 Development and evolution of logistics

h1) Evolution from transportation chain to logistics chain and supply chain. Currently, the logistics industry in China has shifted its focus from traditional cargo transportation to the offer of integrated, one-stop, and full-chain logistics solutions for production enterprises. At the same time, logistics enterprises and manufacturing enterprises are substantially integrated. Logistics enterprises further integrate internal and external logistics resources of customer enterprises, providing customers with integrated logistics services of procurement, production, sales, and terminal customer services across the industrial chain and supply chain.

2) Evolution from informatization to digitalization and intellectualization. With the recent implementation of new-generation technologies for logistics and related policies that support and guide the development of “Internet+” efficient logistics, the development of smart logistics has accelerated consistently. The logistics industry is undergoing a transition from informatization to digitalization and intellectualization. In addition, data connectivity promotes the logistics linkage among industrial chain enterprises and greatly improves the end-to-end circulation transformation efficiency and the logistics production coordination efficiency.

3) Evolution from independent transportation, warehousing, and handling to integrated and efficient “warehousing - trunk line - distribution”. Logistics enterprises have shifted their development focus from trunk line transportation, warehousing management, urban distribution, packaging, handling, centralized procurement, distribution, cross-border logistics, reverse logistics, and supply chain finance and other independent links to the delivery of integrated logistics services such as “warehousing-trunk line-distribution” and “logistics-trade-finance” systems, which are more conducive to the integration between transportation modes and the coordination of logistics services.

In summary, to improve the logistics performance level, adapt to and guide the adjustment of the macro-industrial structure, optimize the logistics market structure, and improve the intensive level and the micro logistics operation efficiency, etc., it is necessary to enforce the development of new business forms and new development models of logistics, promote the integration of logistics resources, remove intermediate links, accelerate the application of new logistics technologies, reshape and rebuild the logistics organization process and ecology, and promote the high-quality development of logistics.

2 New requirements for the innovation in business forms and models of logistics

2.1 Enhancing rapid construction of “new infrastructure” to promote changes in business forms and development models of logistics

The construction of new infrastructure is driven by new

technologies and based on new-generation information network. With the goal to establish a new system for digital transformation, intelligent upgrading, integration innovation, and other services, it is of important and long-term significance for the logistics industry development. The following construction work is carried out: 1) New logistics infrastructure network, such as smart business parks, is conducive to improve the intellectualization level and promote the development of models for automatic sorting and warehousing, etc.; 2) new logistics information network, including a monitoring information platform for urban smart logistics; 3) new energy network, including the popularization and application of new energy logistics vehicles, layout optimization of charging piles and refueling (hydrogenation) stations, and research and development of trackless dual-source electric trucks, etc.; 4) new logistics service network, such as the automatic distribution system, business forms related to network platform freight, just-in-time direct delivery, etc., will further promote all-round changes in new business forms, new development models, new economy, industry business forms, production organization, and management approaches, etc.

2.2 Streamlining international and domestic logistics circulation to build a new development pattern

Logistics serve as the foundation of economic circulation. In the future, China will continue to accelerate the formation of a new development pattern, in which domestic circulation will play a dominant role while international and domestic dual circulations will complement each other. China will have an increased pace of establishing a complete domestic demand system, activate the ultra-large-scale domestic demand market with more economical, convenient and efficient logistics services, streamline production, circulation and consumption, promote the integration development of logistics with supply chain and industrial chain, strengthen the important supporting role to enhance the economic competitiveness, and consolidate the foundation of domestic circulation. Meanwhile, China will enhance the construction of international logistics and trade corridors, actively promote the development of China-Europe Railway Express, international air freight and other logistics organization models, and establish a secure and convenient international logistics supply chain system to ensure the national industrial chain safety and international supply chain stability.

2.3 Developing intensive and green logistics models to promote the ecological civilization construction

The CPC Central Committee has highlighted the great importance of ecological civilization construction, emphasizing the need for developing green logistics, promoting intensive and efficient logistics organization, and reducing energy consumption and pollutant emissions. The development of joint distribution, multimodal transportation, net-

work platform freight, vehicle-cargo matching platform, logistics cloud warehouse, and other new business forms and new development models, is helpful to improve the collaborative interconnection of logistics facility network, organization network, information network, standards and regulations; such development will advance the effective integration of scattered logistics resources and various elements and implement the integration of all methods, players and links across the logistics chain, so as to minimize the logistics links and invalid operations, improve the logistics efficiency, and achieve a green and efficient development of logistics.

3 Development paths to promote new business forms and new development models of logistics

In recent years, with the rapid development of information technologies such as the Internet, big data, Artificial Intelligence (AI), the Internet of Things, logistics application scenarios have been continuously enriched and new business forms and new development models have constantly emerged in China. The traditional logistics industry pattern has been updated with a new logistics market, which has fostered new drivers of growth. In consideration of the necessity of government promotion, the significant increase in development benefits, and the growing bottleneck problems, the following initiatives are suggested to promote innovation and changes in business models of logistics.

3.1 Promoting efficient integration of trunkline organization models with a focus on multimodal transportation

The multimodal transportation is an advanced form of freight logistics with its fundamental function to provide a complete “door-to-door” cost-effective cargo transportation service by making full use of overall advantages and combined efficiency of various transportation modes, implementing seamless integration of different transportation modes, and offering convenient and rapid transshipment. The critical goal of multimodal transportation is to solve the organization problems of cross-modes, cross-departmental and cross-regional integrated transportation, as well as developing fair market operation rules, infrastructure network, standard and universal transportation equipment technology, open and interconnected information sharing mechanism, standardized multimodal transport entities, and policies that greatly support industrial development, etc.^[5]

1) Improving the professional service capability of multimodal transportation hubs. The development of multimodal transportation business is substantially constrained due to the lack of professional multimodal transportation hubs and the insufficiency in transportation service capability. To solve the bottleneck problems, China will increase the pace of

improving the multimodal transportation hubs’ connection efficiency, collection and distribution capability, cargo transshipment efficiency, operation management efficiency, and level of informatization and intellectualization; additional solution also includes providing diversified services such as cargo consolidation, transshipment, distribution, circulation processing, transit trade, and transaction settlement in a coordinated and overall manner, to further improve the service capability and quality of multimodal transportation hubs.

2) Strengthening the connection of multimodal transportation rules. Currently multimodal transportation still depends on respective organization by mode and link. Due to the poor uniformity and connection among all transportation modes with their own independent document system, it is difficult to efficiently organize the full-process of “door-to-door” logistics services. It is necessary to further promote the one-bill coverage system of multimodal transportation, explore the bill of lading and real waybill rights, improve the standardization and generalization of waybills, and achieve uniformed rules, clear prices, rights, as well as responsibilities among different modes of transportation. Improvement is also needed for the integration of transportation safety conditions, cargo delivery and service specifications, and insurance and claim settlement standards, etc.

3) Promoting the integration and sharing of information resources. China will establish an information sharing mechanism, accelerate opening of hub stations as well as capacity allocation and route planning of data resources, and release more data dividends in the market. In addition, China will advance the construction of public information system for multimodal transportation, promote the government information interconnection, and share information among industries, modes and departments to meet the needs of multimodal transportation carriers and provide enterprises with one-stop integrated services.

4) Improving the system for international and domestic multimodal transport. China will promote the model of dual-track transportation through “inland containers + international containers”, establish a domestic multimodal transportation system with 45-foot standard inland containers as carrier, improve the international multimodal transportation system with international standard containers as carrier, enhance the development and application of related professional facilities and equipment, increase the integrated multimodal transport capability, and build a safe and efficient logistics network through the integration of both internal and external resources.

3.2 Promoting integrated development of terminal organization models with a focus on joint distribution

As a reasonable and efficient form of distribution, urban joint distribution is an important and increasingly popular approach to improve the urban logistics efficiency. It is also

an advanced logistics mode that is widely applied in developed countries and has a significant influence (see Tab. 2). In essence, joint distribution is an optimal distribution of cargoes from different suppliers and consumers through centralized collection and reasonable and effective transportation, with a basis of optimal arrangement in time, quantity, frequency, and routes. Strengthening the management over urban joint distribution is conducive to improving vehicles' cargo load factors, reducing average haul distance, saving logistics processing space and human resources, improving circulation efficiency, maximizing social benefits, and significantly mitigating traffic congestion, so as to promote the sustainable development of cities [6].

1) Optimizing the layout of joint distribution network nodes. China will establish service network systems with urban distribution nodes featuring clear hierarchy and orderly connection. Urban distribution channel network systems are also developed with smooth connection of trunklines to form a third tier urban distribution system featuring point-to-surface integration, connection of trunklines, and high convenience. Such a system consists of logistics distribution centers, public distribution centers, and terminal distribution nodes. In addition, the locations, scales, main functions, collection and distribution modes of main distribution nodes will be reasonably designed, and the rights and responsibilities of all distribution nodes will be clarified to ensure strong connection.

2) Implementing innovations in joint distribution models. The application of many advanced distribution models will be promoted to provide unified warehousing and distribution services for the upstream manufacturers, suppliers and downstream distributors or agents in the supply chain. These models may include ground distribution for logistics parks, unified distribution for chain operations, joint distribution for convenience stores in business districts, joint distribution for professional market merchants, and shared distribution for terminal resources.

3) Promoting information connectivity and the application of new technologies. Information connectivity is a foundation of business collaboration. It's important to promote the interconnection and sharing of information on upstream and downstream links of joint distribution, including sharing information of goods sources, vehicle source information, transportation business management, as well as intelligent schedule, etc. Also, it is necessary to promote the real-time docking of cargo transportation demand and vehicle transportation services supply and implement intelligent warning control, overall distribution control, and data decision-making support. In addition, information platforms, such as regional logistics information service platforms, public service platforms for business parks, and distribution enterprise logistics platforms, will be connected. Various kinds of distribution information resources will be effectively integrated to establish a multi-level joint distribution informatization system with smart and informationized joint

distribution.

4) Establishing a reasonable benefit distribution mechanism. A fair benefit distribution mechanism will be established by using information technology, blockchain technology, and other advanced approaches to ensure fair sharing of logistics costs and joint distribution benefits among relevant enterprises.

Tab. 2 Performance of joint distribution in Tenjin, Fukuoka in Japan

Index	Before joint distribution	After joint distribution	Performance/%
Number of trucks	75	26	65
Total driving distance/(km·d ⁻¹)	815.8	251.4	69
Total parking times/(times·d ⁻¹)	502	139	72
Total parking time/(h·d ⁻¹)	100.4	82.9	17
Average parking time/(min·d ⁻¹)	12	35.8	198

Source: Nittsu Research Institute and Consulting Inc, 2018

3.3 Innovating in models for logistics equipment recycling and sharing with a focus on equipment sharing

Equipment recycling and sharing is a necessary way to promote the green, low-carbon, efficient and integrated development of logistics; it also represents an important filed to implement specialization of logistics, cultivate the professional equipment rental market, develop new technologies for equipment management, reduce enterprises' equipment costs, and develop a sharing economy. According to the monitoring data from the special project of business logistics standardization and the initiative work of logistics standardization organized by the Ministry of Commerce, the Ministry of Finance, and the National Standards Commission of China, the pilot areas leased and used more than 15 million pallets in 2017; the average cargo damage rate of pilot enterprises dropped by 61.4%; the unit cost of cargo transportation and handling decreased by 59%; the vehicle turnover rate increased by 1.17 times. In 2017, the supply chain logistics benefit reached CNY 9.56 billion, with CO₂ emissions reduced by 130,000 tons and more than 2 million mature trees retained^[7]. Currently promoting the recycling and sharing of vehicles, semi-trailers, handling machinery, pallets, containers, and other logistics units becomes a critical area that demands fast development.

1) Implement innovations in operation models. China will promote a unified business model for third-party logistics carrier equipment operators, carry out extensive exchanges in the system using logistics platforms, and strive to ensure efficient handover, circulation and maintenance of logistics units between upstream and downstream enterprises across the supply chain. The recycling and sharing of unitized loading equipment and devices, such as containers, pallets, cage trolleys and turnover boxes, as well as the construction of the pallet service operation system, will be supported to promote the circulation of second-hand containers. In

addition, the development of sharing models, such as public trailer pools, transport capacity pools, and pallet pools, as well as new transportation models such as drop-and-pull transportation, will be encouraged and supported. Meanwhile, enterprises are encouraged to use intelligent pallets and other unitized packaging technologies and reusable refrigeration containers or bags suitable for online sales of fresh agricultural products to improve distribution efficiency.

2) Developing and applying advanced information technology. Relying on the new-generation information technologies such as mobile Internet, cloud computing, big data, and the Internet of Things, as well as software and hardware technologies including RFID electronic tags, GPS and GIS, an advanced information management platform for recycling and sharing of logistics can be developed to integrate equipment assembly, smart allocation, maintenance, leasing, charging, financial operation, and other functions; such integration can be used to realize effective connection, scientific organization, and reasonable allocation of material flow, capital flow, and information flow across the entire supply chain and industrial chain of logistics, and further build a number of cross-industry and cross-domain demonstration platforms for supply chain collaboration, transaction, and service.

3) Establishing service protocols. China has explored the unified use of standard logistics carrying units and implemented a service model in which logistics carrying units with cargoes are directly recycled through the shared system network at terminals upon inspection and appropriate maintenance without any intermediate links. An important focus is the development of unified and standardized transportation service protocols based on management regulations of various market players and stakeholders in market organization, business management, safety control, and expense and insurance claims settlement; such development will strengthen a seamless, safe, and efficient connection and further optimize the whole process of logistics organization and business operation.

4) Promoting standardization of the supply chain. Through production, purchase, use, and maintenance of standard carrying units, China will unify standards for logistics warehousing, handling, transportation, distribution and other links. These standards will also be refined for the construction and functional design of infrastructure such as logistics parks, logistics centers, distribution centers, and allocating centers to allow for extending from logistics to the areas of manufacturing, commerce and trade, promoting the standardization of upstream and downstream facilities and equipment, and upgrading the overall efficiency of the entire supply chain. Meanwhile, China will enhance the connection between domestic standards and international standards, actively blend them into the global supply chain, increase its worldwide influence, and improve the capability and efficiency of resources global allocation.

5) Cultivating key leading enterprises. China encourages

the establishment of a logistics unit recycling and sharing market system with enterprise-led, government-guided, and industry-university-research integration. Cross-sector and consolidated innovation service platforms are promoted. Meanwhile, it is necessary to help key leading enterprises in technology development, brand cultivation, market development, as well as standardization of services, inspection, testing and certification. In addition, China encourages social capital to set up industrial investment funds and provide financial support for enterprises to achieve logistics unit recycling and sharing through capital pooling and fund channels consolidation.

3.4 Implementing innovation in organizational forms of logistics market with a focus on networked freight

Networked freight is a logistics platform with service resource integration and trading based on modern information technology. Relying on unified information system, settlement system and service standard, it can realize intensive integration of logistics resources, improve logistics service quality, and reduce social logistics cost. Currently, China has 5.133 million individual private transportation operators, which accounts for 90% of all operators. Each operator has 2.38 trucks on average, which is still far behind the level of 20 in the United States and 64 in Europe^[8]. The low concentration of freight logistics market has limited the effect of scale economy and has resulted in massive waste of transportation resources during the optimization allocation process. Active development of roadway-based freight transportation through network platforms can be helpful to integrate logistics resources such as transport capacity, warehousing, distribution, technology, and manpower and to improve the organizational level of freight logistics.

1) Accelerating improvement and iteration of logistics technology. The Internet platform is a basic element and key link of networked freight. Constant upgrading and iteration of advanced information technology is conducive to improving the capability of network platforms to manage and control transactions and transportation throughout the whole process. Installation of surveillance videos can support a visualized transportation process and 4G-based active safety technology enables prompt correction of irregular behaviors of drivers to ensure transportation safety. The blockchain technology is used to build a trustful data sharing service platform and record authentic transaction data involving all links of logistics to ensure the authenticity and reliability of transportation documents.

2) Improving the supply chain service capabilities of networked freight platforms. The big data, cloud computing, and other technologies are used to build a truck-cargo matching platform, based on which optimal routes can be identified through accurate calculation of transportation transactions, trajectory data, credit evaluation and other data to improve the utilization rate of trucks, minimize the un-

loaded ratio of trucks, and shorten the time for drivers' waiting for cargo allocation. In addition, high-quality value-added services, such as freight factoring and one-stop integrated logistics solutions, are explored to increase the collaboration between platform companies and upstream and downstream partners, and improve their own competitiveness.

3) Promoting standardized development of networked freight platforms. To improve the quality of networked freight services, standardized and normalized operating procedures are developed to include carriers qualification review, source release, contract signing, loading and unloading, transportation and other links. Strengthening the regulation for access permission, online service capacity identification, operation and other links is needed to further standardize the operation of networked freight enterprises and create an institutional environment conducive to fair competition and healthy development. In addition, China will establish a credit evaluation mechanism for networked freight enterprises, implement innovation in taxation and digital credit risk control models based on real data, provide channels of income gaining and low-cost financing for networked freight enterprises, and help enterprises expand their business scale and enhance their core competitiveness.

4 Conclusion

The development of new business forms and new development models of logistics is not only an important way to improve the efficiency of logistics operation, but also an important carrier to support the expansion and upgrading of consumption, cultivate new drivers of growth, and establish a modern circulation system. This paper presents an analysis of the trend and necessity of promoting innovation in logistics business models from perspectives such as China's logistics performance level, macro industry and spatial structure,

medium-scale logistics market structure, and micro-scale logistics business structure, etc. Taking multimodal transportation, joint distribution, equipment sharing, and networked freight as examples, this paper proposes key areas and promotion paths for the development of new business forms and new models. At present, the innovation in business models of logistics is mainly driven by the technological innovation. Driven by a new phase of industrial transformation and technological revolution, logistics demand, supply mode, logistics tools, organization mode and other aspects are rapidly changing and quickly iterating.

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