Data Transaction Mode and Its Legal Regulation in the Context of Market-Oriented Allocation of Data Elements

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Abstract. Data is the key factor of production in the development of digital economy while data transaction is the key link of market allocation of data elements. At present, China's data transaction is still facing the realistic dilemma of imperfect legal system of data transaction, difficult data element circulation, underdeveloped data transaction market and unbalanced supply and demand of data transactions. Under the background of market-oriented allocation of data elements and current predicament, it is of great significance to analyze and construct the data transaction model and to carry out targeted legal regulation. This helps to realize the free and safe circulation of data elements and meets the needs of traders in the data element market as well as the needs of legislation and regulation.

Keywords: Marketization of data elements · Data transaction mode · Legal regulation

1 Current Situation and Practical Problems of Data Trading Market

As a new factor of production, data not only has great industrial value but also can be deeply integrated with traditional factors of production such as labor, technology, and land, helping traditional industries to transform to digital development, realizing industrial upgrading and total factor productivity growth [1].

As early as 2015, the Fifth Plenary Session of the 18th CPC Central Committee formally proposed to "implement the national big data strategy". Therefore, to promote the efficient circulation of data resources and make data elements play a greater role in economic development, the Central Committee of the Communist Party of China and the State Council have issued several documents related to the data element market since 2020, officially classifying data as the main production factors alongside the traditional land, technology, labor, capital, etc., and putting forward the direction and key reform tasks of the data element market system construction."Accelerate the cultivation and development of data factor market, establish data resource inventory management

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mechanism, improve data ownership definition, open sharing, trading, and other standards and measures, and give full play to the value of social data resources". This means that under the background of China's socialist market economy system, the primary task now of the market-oriented reform of data elements is to clarify the transaction rules and build a data market.

In 2022, Guangdong will take "comprehensively promoting the market-oriented allocation reform of data elements, further improving the public data management and operation system, and optimizing the data transaction circulation platform and mechanism" as its annual work point, hoping to build a provincial data transaction spot, build a data transaction platform, to severe the Data Market in Guangdong-Hong Kong-Macao Greater Bay Area as well as improve the data infrastructure system in Greater Bay Area.

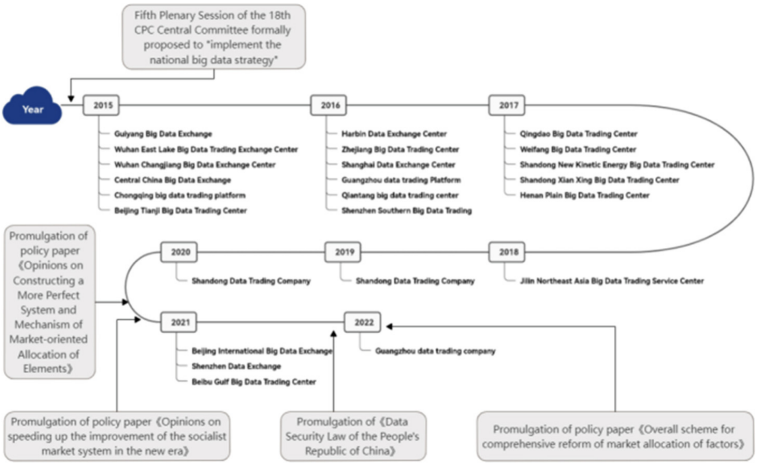

Fig. 1. Policy promulgation and establishment of data platform.

Since the establishment of China's first big data exchange in Guiyang in 2015, there has been a boom in the construction of data exchanges all over the country in the past eight years. Relying on regional advantages, many cities try to set up data exchanges with regional characteristics. For example, on November 25, 2021, Shanghai Data Exchange was unveiled, which conducts comprehensive big data transactions around the world. In March 2022, Guangzhou Data Trading Co., Ltd. was formally established to explore the establishment of a multi-source data fusion application platform. According to the statistics of "White Paper on Big Data" (December 2021) published by the China Institute of Information and Communication, from 2014 to 2017 alone, 23 data trading institutions guided by local governments were set up in China. According to incomplete statistics, there are currently more than 30 big data trading institutions in China (see Fig. 1). The development of the data trading market and the improvement of market system construction are gradually becoming an indispensable and important part of economically developed cities to achieve high-quality development.

However, although the current data trading market seems to be prosperous, it still implies many problems. Take Guiyang Data Exchange as an example. At the beginning

of its establishment, the institution estimated that the daily transaction volume in the next 3–5 years would reach 10 billion yuan. However, in the following years, the transaction volume target of Guiyang Data Exchange decreased year by year, from a "daily transaction volume of 10 billion yuan" to "strive to exceed 100 million yuan throughout the year". Other data exchanges and trading platforms also have such problems, as many of them have virtually stopped operating. The "White Paper on Big Data" (published by the China Institute of Information and Communication in December 2021) pointed out that since 2014, most of the data trading institutions built in various places have provided centralized and standardized data trading places and services, in order to eliminate the information gap between the supply and demand sides and promote the formation of a reasonable market-oriented pricing mechanism and reproducible trading system. However, after more than seven years of exploration, the operation and development of local data trading institutions have not achieved the expected results. First, in terms of the number of institutions, most trading institutions have stopped operating or changed their business direction, and the number of data trading institutions that continue to operate is very limited; Second, from the point of view of the business model, the landing business is basically limited to intermediary matching, and a series of value-added services, such as Data ownership confirmation, data valuation, delivery and settlement, data asset management and financial services, which were envisaged at the beginning of the establishment of various institutions, failed to land; Third, from the perspective of business performance, the trading institutions as a whole have low data turnover and insufficient market capacity.

The root of the problem lies in the following two factors. First, most exchanges adopt the Data Matching Trading Mode since its low construction cost. They only serve as a trading intermediary to match buyers and sellers to trade on the platform so that they can collect commissions from it. However, under the realistic situation that the number of data products in the current market is scarce, the demand of customers has not been fully tapped, and the data transaction is inactive, this kind of business model is unsustainable. Secondly, in this trading mode, due to the heterogeneity of data, High-value and low-value data are mixed in the platform trading, diluting the overall value of the data. Due to the replicability of data, the lack of corresponding maintenance measures after the transaction easily leads to the avoidance of data leakage and devaluation. Therefore, in the absence of current data trading standards and legal rules, many data providers prefer to choose the "data black market" or "point-to-point" transactions due to their lower transaction costs.

Based on these situations, the effective use of data resources and the open data ecosystem can fully release the digital value and drive the digital transformation and upgrading of traditional industries and the cultivation and development of new formats. China urgently needs to adopt a data trading mode that can stimulate the role of data elements and activate the data trading market to build the data trading market and speed up the formulation of relevant trading standards and legal rules.

2 Trading Mode of Data Factor Market

2.1 Type of Existing Data Transaction Mode

There are many types of trading patterns in the current data trading market, for example, some scholars divide the trading modes into five categories according to the dominant party of data trading: Data Pipeline (1v1) Mode, Customer-Led Data Mart (Nv1) Mode, Supplier-Led Data Mart (1vn), Data Platform Market (N v M) Mode, Market Maker (N To 1 To M) Mode (see Table 1).

According to the specific content of data transaction, some scholars divide the data transaction mode into the following eight modes: Direct Transaction Data Mode, Data Exchange Mode, Resource Exchange Mode, Member Account Mode, Data Cloud Service Transaction Mode, API Access Mode, Data Transaction Mode Based on Data Protection Technology and Data Platform Transaction Mode of Stakeholders. This classification confuses the difference between the data transaction mode and the specific technical methods adopted in the data transaction, making the classification too detailed, which is not conducive to the research of data transaction mode.

According to the core characteristics of data transactions, the existing data transaction modes can be divided into "Data Individual Transaction Mode", "Data Matching Transaction Mode" and "Data Service Mode".

Data Individual Transaction Mode. Participants in the individual data transaction mode are mainly Data Sellers and Data Customers. In this mode, the two parties determine the transaction content through point-to-point contact and consultation and conduct individual transactions directly, and their data transactions are not reached through a third party. This type of transaction mode includes "Data Pipeline (1v1) Mode", "Customer-Led Data Mart (Nv1) Mode", And "Supplier-Led Data Mart (1vN)". Although the number of participants in the transaction is different, and the dominant party of the transaction is different, they are still "point-to-point" individual transactions when they focus on the transaction itself.

Advantages. The custody of both parties is conducive to the retention of property rights, and the corresponding data services and data products can be customized according to actual needs.

Disadvantage. The transaction is opaque, and the lack of supervision is easy to secretly infringe the rights and interests of third-party data subjects.

Data Matching Transaction Mode. The data matching transaction mode is also called "data mart mode". The main transaction participants are Data exchange, Data Sellers, and Data Customers. In this mode, data trading institutions mainly deal with the raw data of rough processing, without any preprocessing or in-depth information mining analysis of the data, and only collect and integrate data resources to form data packets or data sets for direct sale [2]. Generally, transactions between data suppliers and demanders are centralized in government-led exchanges, and data is transferred from data providers to data demanders through centralized data exchanges.

Advantages. Increase the participation of the government-led data exchange can make the on-floor transactions supervised by the third party, which can effectively protect the

rights and interests of data subjects. At the same time, through the centralized matching of exchanges, it is easier for data suppliers and demanders to find matching transaction objects.

Disadvantage. Due to the replicability of data, it is easy to be intercepted when it is traded through a third-party exchange, and there are loopholes in the security of data sets.

Data Transaction Mode. Data service mode is also classified as data value-added service mode by some scholars. The main participants are Data Trading Platforms, Data Sellers, and Data Customers. In this trading model, the data trading organization does not simply match the buyer and the seller, but classifies, cleans, analyzes, models, and visualizes the basic resources of big data according to the needs of the same users, forming customized data products, and then providing them to the demander.

Advantages. It can customize the data resources according to customer requirements, which is more in line with the actual application needs of customers.

Disadvantage. It has higher requirements for data providers. In addition to high-quality data sources, data providers should also have a higher level of data mining and processing, which essentially sets a higher threshold for data providers to enter the market.

All the above-mentioned data trading modes have their characteristics, but their common feature is that they do not have a detailed division of labor among all parties in the market, especially in the data supply link. They often hope that data providers can directly provide directly tradable data sets, data packets, finished data products, and data services. This high demand for a single data provider objectively limits the volume of data trading products in the market. Without sufficient data trading products, the market is bound to be difficult to be active, and the effective circulation of data elements is even more impossible.

Table 1. Schematic Diagram of Data Transaction Mode Classification

Type	Classification of data transaction mode		
	Data transaction mode	participant	characteristic
Traditional mode	Data individual transaction mode	data sellers/data customers	**1v1/1vN/Nv1**
	Data matching transaction mode	data exchange/data sellers/data customers	**N to M**
	Data transaction mode	data trading platforms/data sellers/data customers	**N to 1 to M**
New Pattern	Data division transaction mode	data vendors/data processors/data trading platforms/data customers	**N to 1 to M to C**

2.2 A New Type of Data Transaction Mode: Data Division Transaction Mode

Based on the characteristics of "heterogeneity", "replicability" and "non-exclusivity" of data, we can divide the roles in the data transaction process, distinguish the links between data collection and data processing, encourage non-data industry companies to upload their legally owned data to the data trading platform for trading after data desensitization and data security inspection and expand the sources of high-quality data. And cultivate specialized companies for big data analysis and application, and conduct in-depth mining and processing of data resources in the data market to form rich data products and expand the supply of applied data products in the data market.

Content of Data Division Transaction Mode. Under the data division trading mode, the participants in the transaction mainly include the data provider, data processor, data demander, and data trading platform. Under this kind of transaction, there can be two modes: "data product development mode" around data content and "data service customization mode" around customer demand.

In the data product development mode, the primary data products (data packets) collected and sorted by the data provider are linked to the data trading platform through encryption technology, and the data processor uses its professional knowledge and technology to mine and develops the big data in the data packets, and the same data can form data products with different subdivision directions and functions (enriching the form and quantity of data products). The data processor uploads the processed secondary data products to the platform. Users choose the corresponding data products according to their own application needs (see Fig. 2).

In the data service customization mode, data users publish their requirements for data products in specific application directions on the platform according to their own application needs. The data processor uses its experience accumulation and professional ability in a specific field to purchase the corresponding data packets from the data vendors on the platform according to the needs of users, and carries out corresponding data mining.

Advantages of Data Division Transaction Mode. Compared with the traditional model, the data division trading mode has obvious advantages, which can effectively broaden the source of on-site data, deepen the mining of original data, and enrich the number of on-site data products.

The traditional trading mode is that the data provider collects data, mines, and processes it by itself, and then sells the products to customers through the data exchange or data trading platform. This type of transaction requires a high level of data providers, which not only requires them to have a large amount of original data but also requires them to have the ability of data mining and analysis, which essentially sets a high entry threshold for data providers. As a result, the number of data providers with both data property rights and data mining capabilities is small. Therefore, there is not enough circulation of data trading products in the data trading market, and it is difficult to form market competition. This situation limits the function of the data factor market and makes it unable to achieve institutional goals.

The data division transaction mode divides the role of traditional data business in data collection and processing into two parts, and data collectors can directly list their legally

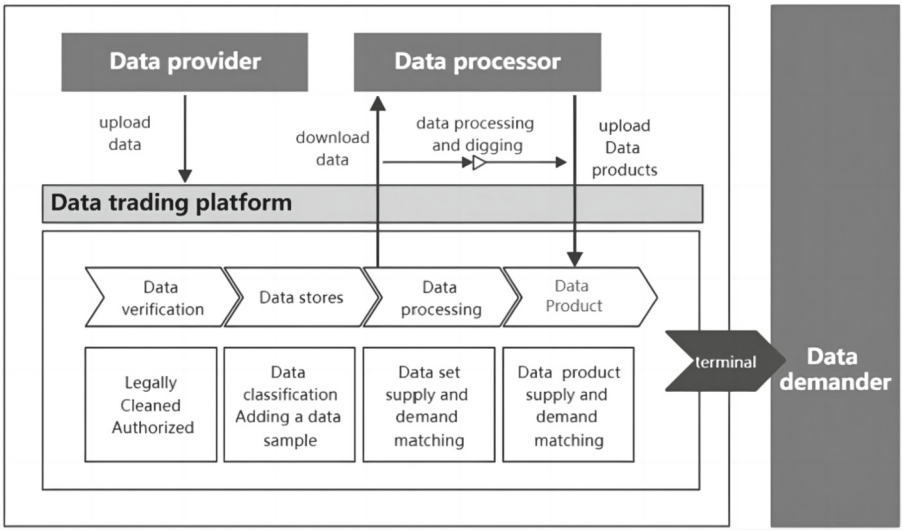

Fig. 2. Schematic diagram of data division transaction mode

collected data, the primary data products after cleaning and anonymization, that is, the legal data packets after security processing, on the data trading platform for sale. By making data samples, subdividing data types, and summarizing the basic characteristics of data packets, data packets can be found and purchased more easily by downstream processors or customers.

Broaden the sources of legal data in the trading market and enrich the data supply. In this trading model, the entry threshold can be relaxed, and outside the specialized data operation companies, ordinary Internet companies are allowed to anonymize the legal data obtained in their daily operations and then put them on the open data trading platform for trading. On the one hand, it can encourage more companies to upload legal data, participate in the data trading market, broaden the data sources of the data trading market, greatly enrich the data types in the data market and increase the total amount of data in production. On the other hand, it provides more trading opportunities and introduces supervision at the same time, which reduces the sale of data by Internet companies through over-the-counter transactions and damages the rights and interests of data subjects [3].

Promote the depth of data mining and enhance the value of data products. Mining primary data products through specialized data processing companies can increase the depth of information mining in data packets and make full use of data. Professional data processors purchase relevant data products for deep processing, produce a variety of data products through modeling, big data analysis, visualization, and other means, and sell them in the corresponding data finished product areas on the platform. The advantage of mining data through professional data processors lies in that data processors specialized in specific fields can dig the value of data information in development packets more deeply, make full use of the information contained in the data, and make their products more in line with customers' needs and bring greater benefits.

Promote the multi-domain development of high-quality data and promote the competition in the data market. Different from other factors of production, the value of data will not decrease because of its use, but will show higher value because of continuous and in-depth mining. The same data may also show different use-values for different users and different fields of use [4]. Based on the replicability of data, the same data packet can also be distributed to multiple data processors to mine and develop data products in different directions, so that the data can be utilized in multiple dimensions, the terminal data products can be enriched, and the full competition in the data trading market can be promoted. Make the data elements flow in production.

By subdividing the links of data transactions, and encouraging more enterprises to invest capital and technology in the links of data processing and mining, a subset of products more suitable for market segments can be produced as trading items, thus promoting large-scale.

3 Legal Regulation of Data Factor Transaction

Although China's national macro policies explicitly encourage big data transactions, laws and regulations that directly regulate big data transactions are still absent. Especially in the absence of a unified data market at present, the trading rules of various exchanges and trading platforms are different, and the data traders can't effectively and centrally control risks, which leads to uncertainty of trading and instability of relief.

Key issues closely related to data transactions, such as the definition of data property rights, the distribution of data ownership, and other basic issues, have not been solved either. Not only has there been no institutional arrangement in legislation, but academic researchers have also failed to reach a consensus on these issues. However, the basic issues such as data ownership are quite complicated. If we wait until we have a full understanding before we construct the data market, we will undoubtedly miss the opportunity for data element development. Therefore, we should hold the view that we should first promote the development and utilization of the data market, and then gradually explore issues such as data ownership. It is the key direction of the current legal regulation of the data factor market to construct the data ownership legal system and the data transaction legal framework through the pilot practice while building the data transaction market.

Data has high timeliness. Only when data is traded to the demander within the limitation period can it realize its expected value. Legislation should promote the efficient circulation of data. At the same time, the data is aggregated, often in the form of scale, and once leaked, it will cause serious consequences. Therefore, when exploring the norms, standards, and management methods of the data trading industry in practice, both efficiency and security should be considered.

3.1 Internal Review of Data Platform

Big data exchange and big data trading platforms undertake two major functions of service and management in the market, that is, the "organizer" of market transactions and the "supervisor" of transactions. When the rules are formulated, the exchange and trading platform should be entrusted with the supervision responsibility, and their own

organizational structure should also involve the government, especially when public data sharing is involved in data market transactions.

Compliance Review of Data Transactions. The whole process of the data transaction, the data platform shall conduct a repeated compliance review to ensure that the transaction complies with the provisions of existing laws, and whether it meets the requirements of the Data Security Law of the People's Republic of China, the Personal Information Protection Law of the People's Republic of China and other laws and regulations.

Protection of rights and interests of data subjects. For the data set provided by the upstream data provider, focus on whether its data has been cleaned and desensitized, and obtain the authorization of the data subject. Eliminate illegal data and desensitized substandard data, ensure data quality and safety, and protect the rights and interests of data subjects.

Establish a Data Security Mechanism. The trading platform should have the data security capability, set up a special department for data security, and update the data security technology dynamically. Evaluate the data nature of data providers, data processors, and data consumers in the process of data information transaction and application, and examine whether they have the ability and plan to protect data information.

3.2 External Specification of Data Platform

Legislative aspect. To promote the efficiency of data transactions, we should distinguish the types of tradable data and the scope of non-tradable data as soon as possible, define the boundaries of data transactions, and encourage non-data transaction enterprises to invest their legal data in the data transaction market. Strengthen the legal protection and incentive measures of on-site data transactions [5].

In terms of data security, we should improve the legal framework of data security and prevent data security risks. The legislative department should formulate the Measures for the Administration of Data Transactions as soon as possible according to the pilot situation, strengthen the policy guidance for data transactions, and clarify the management mechanism, concept definition, participation role, and the rights and obligations of each subject of data transactions. At the same time, we should speed up the institutional arrangement of data ownership, and clarify the legal status of data ownership, use rights, management right, and platform right.

Administrative Supervision Aspect. In terms of supervision, it is necessary to clarify the competent department of data transactions, so as to avoid cross-jurisdiction of multiple departments and unclear powers and responsibilities, which will lead to the absence of supervision of data transactions in essence.

Social Participation. Encourage industry associations, research teams, and key enterprises to collaborate to build schemes and standards for data security processing technology, and provide a reference for the evaluation of data transaction security.

4 Peroration

The construction of a data trading mode plays a key role in the data trading market. By subdividing the role of the data trading mode and removing the substantial restrictions on data providers, the data supply sources can be effectively broadened and the data volume in China's data trading market can be effectively increased [6]. At the same time, by refining the division of labor and cultivating professional data analysis and processing enterprises, we can deepen data mining, improve the utilization efficiency of data resources, and enrich the supply of data products. However, lowering the market entry threshold does not mean that the threshold is not needed, regardless of the security of data transactions. The construction of the data trading market should pursue efficiency as well as transaction security and data security. Therefore, it is necessary to build internal and external coordinated data trading legal regulations, improve internal review and external supervision of data trading, and build a multi-dimensional data security system from the aspects of legislation, law enforcement, and social participation.

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