A Novel Method of Data Element Trading and Asset Value Appreciation

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Abstract. Data elements, as a new type of production factor, have begun to be integrated into the national economic value creation system. Data assetization is an important way to realize the value of data elements. However, data assetization belongs to a completely new field, and many fundamental issues remain to be solved. From a theoretical perspective, it is important to understand the connotation of data assets and data assetization, grasp the prerequisites for data assetization, and recognize the evolution rules and value realization methods of data assetization. From a practical perspective, current data assetization development faces problems such as the lack of data element classification and grading standards, the absence of data ownership standards and transaction system rules, the scarcity of data operators, and the absence of a data trading ecosystem. It is necessary to establish a data element classification and grading standard system as soon as possible, explore multi-dimensional classification and ownership mechanisms, and promote trial trading of data products with clear value application scenarios, gradually cultivating and enriching diverse data providers and data trading ecosystems.

Keywords: data assetization, data element, value appreciation.

1. Introduction

As a new type of production factor, data elements are an important driving force for promoting high-quality economic development. Data assetization belongs to a new field and there are still many fundamental issues that need to be further addressed. Among them, it is urgently necessary to understand the connotation of data assets and data assetization, identify the ownership of data assets, and grasp the basic prerequisites for data assetization. At the same time, there should be a deep understanding of the value realization methods and general evolution rules of data assetization, so as to have targeted measures in each stage of the development of data assetization. Based on this, this paper focuses on exploring the basic connotation of data assetization, the identification of data element ownership, the evolution rules and value realization methods of data element assetization, and the key issues that need to be addressed for the development of data element assetization. Recommendations are also made to promote the value realization of data element assetization.

2. Related Research

*Academic literature review:*A literature review of academic research on the concept of data element marketization reveals that it was officially proposed in 2020 and is still in the stage of top-level design and exploration[1]. Data assetization, as an important part of data element marketization, was further studied by the academic community in 2022 and belongs to a new frontier research field. Currently, research on data element marketization mainly focuses on two aspects:

Firstly, fundamental issues such as data element governance, data element property rights, data security, and the value characteristics of data elements have been researched[2]. For instance, the basic concepts of production factors, including digital factors, from the perspective of production factor theory, and discussed the commonalities and characteristics of data elements and other production factors. The value explored characteristics of data elements, arguing that to realize their value, data elements need to be comprehensively and accurately analyzed with the help of algorithmic computing, and that combining data elements with traditional production factors can create higher

commercial added value. The issue of protecting personal data property rights in the era of data industrialization, proposing mechanisms such as improving informed consent protection rules, establishing a diversified supervision mode, and perfecting data inspection public interest litigation system for data protection[3].

Secondly, research has focused on the system framework of data element marketization, including the circulation of data elements, the construction of data element markets, and the institutional system of data element marketization[4]. For example, an in-depth study of data element circulation, market defects, and regulatory measures, proposing to build a data property rights platform to promote the integration between an effective market and a responsive government. Eight key points is designed to accelerate the cultivation of data element markets, advocating for the establishment of a data element market ecosystem alliance to stimulate market vitality. Systematically expounded on the basic institutional design for promoting data element marketization reform in terms of property rights, supply, circulation, distribution, and cross-border systems[5].

Overall, current research on data element marketization is still at the stage of fundamental theoretical exploration and top-level design, with relatively little discussion on the specific application of data elements and strategies for value development. As data assetization is an important application area of data elements, there is a lack of research in this field[6]. Therefore, exploring the fundamental issues and practical approaches to data assetization can promote academic thinking and practical exploration in this field and has significant practical significance.

3. Understanding Data Assets and Data Assetization Methods Based on Iasb Asset Conceptual Framework

Studying the issue of data assetization first requires a clear understanding of what data assets are and their essential characteristics. The notion of data assets has emerged from the development of data resources and information assets, and with the increasing attention given to them during the era of big data[7]. The main difference between data resources and data assets is that data resources generally exhibit non-standardization, non-structure, and uneven quality, rendering them lacking explicit value before being utilized[8]. Conversely, data assets, as assets, possess several unique features, including high quality, high utility value, strong integration, and marketability. The main difference between data assets and information assets is that information assets comprise not only valuable or potentially valuable data that has been recorded, but also implicit knowledge acquired through business activities derived from channels such as employees, customers, competitors, business partners, and markets, i.e., knowledge assets. Against the backdrop of deepening digital economy development, the definition and connotation of digital assets are constantly evolving. From a narrow perspective, data assets specifically denote digital currencies, virtual currencies and other digital technology-generated financial assets, while broadly encompassing all data resources that can bring value or potential value[9]. Data assets have different definitions across different fields, such as the definition provided by the China Appraisal Society, which defines data assets as "data resources owned or legally controlled by a specific entity that can continue to play a role and bring direct or indirect economic benefits". Data assets as data resources owned or controlled by organizations, recorded in electronic or other forms such as text, images, audio, video, web pages, databases, sensing signals, structured or unstructured data, measurable or tradable and capable of directly or indirectly generating economic and social benefits[10].

Currently, there is no unified and clear definition of data assets. Since data assets fall under the category of assets, existing asset definitions can be used to understand data assets. The Enterprise Accounting Standards of China defines assets as "resources with economic benefits that have been created through past transactions or events and are owned or controlled by enterprises." From this perspective, enterprise data assets can be understood as a type of data resource that has been created through past transactions or events, which is owned or controlled by the subject and can bring economic benefits. However, this definition is limited when considering the distribution and attributes

of data resources. Firstly, it can only partially apply to enterprise-level data assets. Secondly, the definition emphasizes ownership or control over resources, whereas for data assets, the ownership type is more diverse and not limited to control or ownership. Moreover, data asset values are highly uncertain, and their value is not limited to economic benefits. Therefore, understanding data assets according to the definition of assets in Enterprise Accounting Standards does not fully cover all data assets. In 2018, the International Accounting Standards Board (IASB) issued a revised "Conceptual Framework for Financial Reporting", which adjusted the definition of assets to "rights with potential economic benefits", representing significant changes from previous definitions. This definition emphasizes that assets are a kind of right, highlighting the rights attribute of assets rather than the physical attribute. This accommodates the needs of economic activities and business model innovations, and enables more new economic resources to be integrated into the asset conceptual framework. At the same time, IASB's asset conceptual framework weakens the standard for the possibility of economic benefits flowing into assets, which is to some extent more suitable for defining the connotation of data assets, because IASB's asset conceptual framework incorporates uncertainty of economic benefits into understanding of assets, and data assets are precisely assets whose value is uncertain. Therefore, even though IASB's asset conceptual framework cannot comprehensively and accurately summarize the connotation of data assets, it still provides a basic basis for understanding data assets.

Whether based on the current accounting definitions of assets or using the IASB's asset conceptual framework to understand data assets, it can be observed that not all data can be included in the asset category. Data elements become data assets when they satisfy two conditions. Firstly, they must have a clear right of ownership over the data, if assets are defined as a type of right according to the IASB asset conceptual framework, then it is necessary to clarify whether a subject has ownership or the ability to exercise related data rights. From the perspective of creating data value, the rights referred to here mainly refer to data property rights. There are mainly four types of data property rights: ownership, usage, income, and transfer rights, and this discussion will focus on these four rights. Secondly, the legitimate utilization of data property rights must be able to generate potential value, which includes both economic and social value. Because data assets value is more diverse than the "economic benefits" emphasized by the IASB asset conceptual framework, data assets' value includes not only the economic value generated by business entities through data assets but also the social value created by government departments through political data assets. Therefore, the value of data assets includes both economic value and social value.

Grasping the concept and connotation of data assets is helpful for better understanding data assetization. Data assetization is the value creation activity centered around data elements, i.e., the process of assigning market value to data elements. Data element value creation activities include data collection, processing, governance, development, and trading, with the ultimate goal of promoting data element transformation into data assets, stimulating and unleashing data element value potential. Data assetization is beneficial for revitalizing all of society's data resources, creating new economic and social value, and is also one of the primary focuses of digital economy development.

4. The Evolutionary Laws and Value Realization Paths of Data Assetization

4.1. The general evolutionary laws of data assetization

After clarifying the basic premise of data assetization, it is necessary to have a deep understanding of the general evolutionary laws of data assetization in order to realize the transformation of potential value of data into value creation, value realization, and value added conversion. The general evolutionary laws of data assetization mainly go through four stages: "data assets - data products - data commodities - data capital", promoting the transformation of potential value of data into value creation, value realization, and value added conversion, as shown in Figure 1.

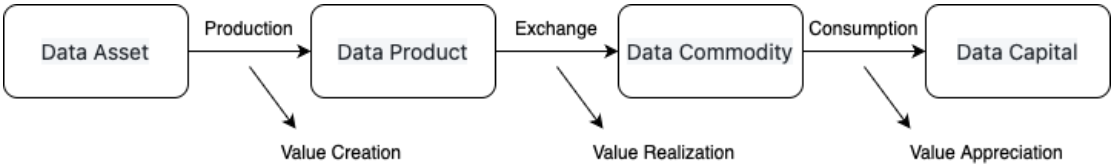

Fig 1. Evolutionary laws of value realization in data assetization.

4.1.1 Further clarification and integration of data assets

It is necessary to select and process a portion of data resources with potential value development from a large amount of data resources. These data resources with potential value development can be regarded as data assets to some extent, and are also the starting point for data value development and realization. Data assets are generally recorded and stored in physical or electronic form and are static data before being developed and utilized. They need to be transformed into dynamic and usable data through data classification, integration, and processing. The prerequisite for data value realization is to conduct preliminary processing on the data to improve the quality of data resources. The potential value of data assets before becoming data products mainly manifests in two aspects: first, improving production efficiency through business data; second, combining data elements with other production factors to form new business models and create data value.

4.1.2 Value development and productization based on data assets

By developing the value of data assets and producing data products and services, this process makes the potential value of data resources more clear and begins to move towards active value creation. It can be said that data productization has promoted the process of data value realization. Data products include various intelligent management tools and information platforms that empower production and operation, as well as data products that create value for customers in the market. For example, at the level of empowering internal production and operation in enterprises, using data resources to collect, integrate and develop, and using information technology to create an intelligent operation system and management platform, can support enterprises to achieve leapfrog development in aspects such as improving operating efficiency, investment decisions, project planning, product development, and customer relationship management, as well as promoting business model innovation. At the market end, it is possible to develop data products using basic data mastered by oneself to serve external customers, such as developing credit data products to serve financial institutions' credit business.

4.1.3 Promoting the transformation of data products into data commodities

Considering that the market-oriented development of data elements in China is still in its infancy, data products and data commodities are often not strictly distinguished. The main difference between data products and data commodities lies in the circulation and transactional aspects, with data products focusing on their application value and having less apparent transactional attributes. Data commodities, on the other hand, are primarily used for trading, and can be considered as data products specifically designed for exchange. The value of data products is realized through transactions. The main challenge in transforming data products into data commodities is standardization and generality. If data products are difficult to use for external users or have a high degree of specificity, it will hinder market exchange and make it difficult to realize their value and usefulness.

4.1.4 Gradually realizing the transformation of data commodities into data capital

The transformation from data commodities to data capital is the advanced stage of data asset securitization. At this stage, the consumption of a large number of data commodities has promoted the intervention of capital and provided an important foundation for value appreciation of data commodities. The transformation from data commodities to data capital is based on the ability of data commodities to be traded multiple times and reused. Based on this, data commodities can be mortgaged like general assets or create new value through securitization. This process is similar to the transfer, circulation, and expansion of financial capital. To achieve the leap to data capital requires

not only highly standardized and universal data commodities, but also the cultivation of diversified market participants and an active and orderly market trading environment.

4.2. The value realization path of data asset securitization

Data asset securitization is an important content in the development of the digital economy. It has enormous practical value and potential value, and has rich application scenarios in promoting economic development, stimulating social innovation vitality, and optimizing social governance. At present, the economic and social value of data asset securitization will mainly be realized through the following ways:

4.2.1 By digitizing business operations, optimizing business processes, and innovating business models

In terms of optimizing business processes, enterprises can use the strong penetrability and cross-border integration of data assets to empower their production and operation, promote the digital development of enterprise businesses, and continuously upgrade their product research and development, service improvement, customer resource development, and strategic management. For example, the use of consumer and population big data, transportation network data, and customer portraits to analyze the development prospects of regional markets provides more scientific decision-making basis for enterprise customer positioning, product pricing, and market development. Enterprises can also construct a data middle platform that meets the needs of business reform, integrate and collect data resources, integrate data from major business departments and collaborative departments, and promote the integration of external data resources with existing business data. Based on this, business process recombination and reconstruction can be carried out, core business management models can be optimized, original business service efficiency can be improved, and the best solution for related businesses can be sought through constructing typical high-frequency application scenarios to achieve intelligent business management.

In terms of innovating business models, data asset securitization has rich application scenarios in fields such as new consumption, community economy, remote work, online tourism, smart parks, smart transportation, and smart cities. For example, in the environment of online, digital, and intensive aspects, data assets can break down barriers, promote the fusion of consumption formats, expand value-added services for consumption, create new business scenarios, and use digitalization to create online product experience showrooms, promoting the two-way acceleration of online and offline consumption. At the same time, the comprehensive and in-depth development of data asset securitization will put forward new requirements for the construction of new consumption infrastructure, which is conducive to stimulating various new consumption formats and models to create new demand. Figure 2 shows the business logic of digitized operations, where digital enterprises, based on platforms and traffic dividends, integrate data assets into their production and operation processes, realize rapid response to customers and markets, and create higher value for customers, and this process in turn continuously promotes the digital development of enterprise businesses.

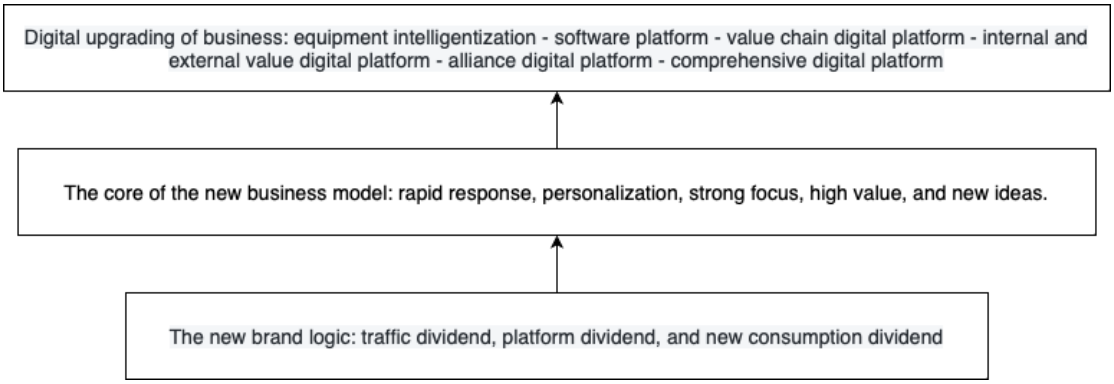

Fig 2. The business logic of digitized operations.

4.2.2 Leveraging digital business to provide commercial solutions for related industries

Currently, the trend of the integration and development of the digital economy and the real economy is becoming increasingly apparent, with deeper connections between industries. The data elements of one industry can provide decision-making support for related industries. By effectively collecting and processing basic industry data, building algorithm models, we can solve the business development obstacles faced by related industries, and realize the transformation of the potential value of data elements into value creation. For example, in November 2021, the data product "Enterprise Electric Intelligence Painting" developed by State Grid Shanghai Electric Power completed transactions on the Shanghai Data Exchange. This product uses data such as enterprise electricity consumption behavior, payment, level, and trend to construct an evaluation model, providing banks with credit decision-making, post-loan management, anti-fraud, and other decision-making references. In the real estate industry, utilizing real estate basic data can provide more valuable information for commercial banks' mortgage loan business and collateral value monitoring, including customer credit evaluation, loan risk control, and non-performing asset disposal. For the utilization of data elements, digital business not only opens up new business fields, but also empowers the development of related industries, with broad prospects for its value.

4.2.3 Creating a new model of "digital governance," supporting smart city construction

The simple smart operation of enterprises and business model innovation are not enough to support the development of smart cities. Only by organically integrating the data elements of the business level and enterprise level with other functions of the city can the assetization of data elements truly integrate into the development process of smart cities. Currently, data governance is widely carried out in more and more cities, and various major cities continuously integrate and optimize government affairs, transportation, medical care, education, and other field data through comprehensive and systematic sorting of basic data elements, promoting efficient, intensive, and intelligent development in various fields. Thus, gradually establishing an intelligent urban operation and service system and improving urban management level. Especially in the context of difficulties, challenges, and multiple risks in economic and social development, making urban operation more efficient and smarter has become a new demand for promoting the modernization of the urban governance system and governance capacity. Through building a "one-screen monitoring, one-network management" digital management platform through "data + technology" to achieve the transformation of regulatory efficiency from static to dynamic hologram, it has become a new trend in modern urban management. In the future, smart city construction still needs to continuously iterate the entire data acquisition and aggregation, full-domain data fusion, and all-dimensional data intelligent analysis needs to help various competent departments insight into the inherent rules of urban development and provide decision-making support. At the same time, introducing new technologies such as big data, the Internet of Things, blockchain, AR/VR according to needs can meet the needs of technology architecture expansion and provide more possibilities for innovation in smart city management. Therefore, the assetization of data elements will play an important role in promoting "overall intelligence and governance" in the future. From the perspective of building a smart city ecosystem, through data empowerment and technology-driven establishment of open business collaboration, industrial incubation, and data circulation platforms, creating new forms of digital economy can enrich the constituent elements and content space of the smart city ecosystem and provide better support for smart city construction, operation, and management.

4.2.4 Continuously releasing the potential productivity of data production, stimulating social innovation vitality

The value realization of data element assetization not only directly creates explicit wealth but also actively integrates into the social innovation system, activates the innovative power of various market entities, promotes social innovation practices, and stimulates the creative vitality of the whole society. In particular, the application of data element assetization can promote deep development in fields such as artificial intelligence, blockchain, vehicle networking, and the Internet of Things, which is

conducive to forming unified technical standards that lead the development trend of the industry. At the same time, the circulation, interconnection, and integration of data assetization are conducive to creating an open innovation ecosystem, forming a social atmosphere of collaborative innovation, and further stimulating the innovative vitality of the whole society.

5. Conclusion and Recommendations

Currently, the development of data element assetization is constantly advancing, and the demand for future data asset trading, circulation, and integration will become stronger. It is necessary to focus on solving the main obstacles faced by the assetization of data elements, especially by systematically sorting out basic data elements, establishing a classification and grading standard system, exploring multi-dimensional classification and authentication mechanisms, and cultivating a data market system and transaction ecology with data merchants as the main body. This will lay a good foundation for mining the value of data elements in multiple dimensions and scenarios, and promote the realization of the value of data element assetization.

Establishing a classification and grading standard system and promoting the foundation of data element governance. Identify the diversity of data rights and explore multi-dimensional classification and authentication mechanisms. Cultivate diverse data operators and data transaction ecological systems. Whether in the development and trading of data element assetization products or in the construction of data element transaction ecological systems, data operators are core participants. Therefore, it is obvious that the cultivation of diverse data operators is important. In the early stages of data element market construction, the cultivation of data operators should adopt a "support the strong and promote the excellent" strategy, supporting market entities with abundant data element resources, clear data asset ownership, and clear value demands to pilot the development and trading of data assetization products, with priority given to key areas such as finance, transportation, electricity, and logistics. At the same time, support and guide big data companies, internet platform enterprises, technology companies, scientific research institutes, and other organizations to jointly carry out industry top-level design, explore innovative business scenarios, and promote the formation of an interactive and collaborative data market system and transaction ecology. As the market gradually matures, the cultivation of data operators should be increasingly diversified, cultivating a group of professional data technology service providers, data transaction platform operators, data transaction service providers, etc., to provide safe, reliable operating, circulation, and application environments for data element assetization products, and promote the realization and value-added of data element assetization value.

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