# The Core Value of Web3.0：Recognition and Measurement of Data Assets

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## Abstract

Currently, there is a surging wave of digitalization, with rapid development in digital technologies such as "Internet+driven by traffic", "big data+driven by data", "artificial intelligence+driven by algorithms", "blockchain+driven by trust", "5G+driven by efficiency". The development of digital technologies has promoted the development of the digital economy. To promote the industrialization and digitization of the digital economy, it is necessary to establish basic systems and standard specifications for the ownership, transaction circulation, cross-border transmission, and security protection of data resources, promote the development and utilization of data resources, and establish a data-centric system.We are determined to pioneer the data asset-based system and explore more in the fields of "data asset ownership, data revenue, and value recognition". We aspire to become a leading standard-setter and promoter of the "data asset-based system" in the digital economy era.

**Keywords:** Web3.0; Digital technology; Value of Data Assets (VD); Decentralized Autonomous Organization (DAO)

As one of the factors of production, data must be fully activated to accelerate widespread data trading and distribution. The process of data assetization is essential. On the one hand, assetization is a prerequisite for the widespread circulation and value-based distribution of data, as a new type of production factor that can be traded among organizations and individuals1. On the other hand, data assetization is an important way to improve enterprise-level data standards and showcase the true value and competitive advantages of the enterprise, promoting digitalization processes.

Let's discuss two issues together. The first issue is to "recognize a fact: the arrival of the digital economy era", and the second issue is to "explore a path: the recognition and measurement of data assets".

What is the digital economy? Many people may have heard of the digital economy, but they may not necessarily have a deep understanding of what it is. Therefore, let me first introduce the concept of the digital economy.

The Digital economy is a new economic form that relies on digitized knowledge and information as a key production factor, driven by digital technology, and facilitated by modern information networks. It continuously improves the levels of digitalization, networking, and intelligence through the deep integration of digital technology and the real economy, accelerating the reconstruction of economic development and governance models. According to the World Bank, the global digital economy reached a size of $31.8 trillion in 2019, accounting for 41.5% of GDP, The scale of the US digital economy continues to rank first in the world, reaching US$13.1 trillion

in 2019; China's digital economy ranks second in the world, reaching US$5.2 trillion; Germany and Japan rank third and fourth, and the UK and France rank fifth , six digits, and the scale of the digital economy exceeds US$1 trillion 2, and has been seen as a new lever to drive rapid global economic development.

Everything is data, everything can be digitized. In this era, with the development of technology, everything can be digitized and turned into various types of data. A basic assumption of digitization is that everything in the world can be quantified. Everything in people's daily work and life essentially follows mathematical rules and can be digitized into data. A new era of producing and sharing data has arrived! Digitization is the process of sampling, mining, analyzing, storing and utilizing massive amounts of data, including all text, images, sounds, videos, and graphics. The core value of digitization is to use data to restore the past, summarize patterns, describe reality, and plan for the future.

Data has the following characteristics: first, data itself is a description of a fact, representing an objective description of something. Second, data can be structured, semi-structured, or unstructured. Currently, structured data is used more frequently, and data in enterprise ERP and SAP databases is mostly structured. Semi-structured and unstructured data are not currently used as much, but they can better explain the essence of things, such as video, audio, and scene data. Third, data production requires cost investment, which includes hardware, software, and labor costs. If you want to purchase data, you need to pay a certain fee. Fourth, data has complementarity. The value of a single piece of data is not great. Data is only useful when the scale is reached to a certain extent and when it has multiple dimensions and good timeliness. The scale, timeliness, and other factors will greatly affect its effectiveness. Fifth, data is infinite. Data has the qualities of replicability, sharability, infinite growth, and supply. Data assets do not need to be depreciated or amortized; they will be used more and more. Data assets themselves are infinitely growing, and they appreciate every year, rather than being consumed. Sixth, data assets have become a key production factor in the digital economy era. In the agricultural era, the key production factors were land and labor, and in the industrial era, the key production factors were capital and technology. In the digital economy era, data is the core production factor. Data is the core asset of countries and enterprises, and it is the new oil that will never run out in the future.

The second issue discussed is the recognition, measurement, and reporting of data assets. Currently, there is a global push to promote market reforms for factors of production such as land, labor, capital, technology, and data, to improve the functioning of the market, and to enhance trading rules and service systems. If data is to enter the trading market, it must have a price. Therefore, in order to incorporate data into production factors and trade it on the market, issues related to the recognition, measurement, and reporting of data assets must be addressed. Accelerating the development of a data-driven digital economy is a trend, and enterprises have accumulated massive data assets in their production and operations, which urgently need to be incorporated into the accounting system, leading to related tax issues.

From the perspective of the meaning of assets, what is an asset? The International Accounting Standards Board has made provisions for what constitutes an asset, namely that "an asset is an economic resource that has the potential to produce economic benefits, which is controlled by an enterprise as a result of past events". There are three key factors in the definition of an asset. The first is the element of "control" by the enterprise, the second is the factor of "producing economic benefits", and the third is the element of "rights". Based on this, we can also define what a data asset is. A data asset is a present data resource that is controlled by an enterprise as a result of past events, which has the potential to produce economic benefits for the enterprise in the future.

There are two characteristics of data as an "asset". The first is that it can help existing products and services achieve revenue growth, and the second is that data itself can directly generate value. In particular, with the first characteristic, data assets empower businesses and help enterprises improve their operations and services. Data itself may not actually generate value, but through the use of data in existing products and services, there is potential for better performance in revenue

growth and cost reduction. Currently, global digital taxes mainly target the first characteristic, so the main basis for global digital taxes is sales revenue. Because the calculation is complex, taxes are generally simplified and based on sales revenue.

What is the relationship between data and revenue? Since data assets empower businesses, internet companies have higher sales revenue than ordinary companies. A more reasonable approach would be to tax net profits, but calculating net profits is a complicated process. The second characteristic is that data assets themselves generate value, and society and enterprises can continuously increase the value of data assets through effective management of data assets, such as through systematic analysis, in-depth exploration, and full utilization, thereby creating new data assets. This involves the tax issue of increasing the value of data assets.

To recognize data assets and include them in the accounting system as assets, there are two conditions that must be met in accounting. First, the enterprise must have the right to generate economic benefits, and the economic resources must belong to the enterprise. Second, the enterprise must be able to reliably measure the cost and value of the economic resources. The first condition is ownership and control, and the second condition is reliable measurement. So, do data assets meet these requirements? Are they possible to achieve?

The ownership of data assets is a problem of data ownership. There are many intermediate processes in the circulation of data, making it difficult to determine ownership. However, if we use blockchain technology to record the flow of data, we can determine the owner of the data. Therefore, the widespread application of blockchain will provide good technical support for clarifying data ownership.

Enterprises that collect personal data should pay a certain fee to individuals, or return the data to the owner through product discounts. This data belongs to the individual, not the enterprise. The enterprise may need to pay a certain cost to acquire the data, and when the individual agrees to transfer the data to the enterprise, the enterprise then owns the data.

The measurement of data assets is currently an important issue that we are studying, which has already been reflected in the capital markets, where the value of internet giants is far higher than that of traditional businesses. From a measurement perspective, data assets are not yet included in the accounting system. To include data assets in the financial reporting system, there is a question of initial and subsequent measurement. How can an enterprise's data assets be measured and recognized in its financial statements? Enterprises should use the following methods to measure the initial and subsequent recognition of acquired data assets, taking into account their business characteristics and risk management requirements. The most basic are three methods: historical cost method for assets that can be costed, fair value measurement for assets that can be priced, and valuation measurement for assets that cannot be priced, such as when there are no mature markets or data available. There are three or more methods for the valuation measurement of data assets, which will not be elaborated here. Whether it is the initial measurement or the subsequent valuation, it involves tax issues. When data assets are first recognized and their value is increased, should taxes be paid? When evaluating the appreciation of data assets annually during subsequent measurement, should taxes be paid on this portion? These are tax issues involved in the measurement of data assets.

The following is a report on data assets. Unlike tangible and intangible assets, data assets in financial statements do not deteriorate due to use and therefore do not require depreciation or amortization in daily accounting. A "data asset" item can be specifically set up in the balance sheet to classify productive data assets and consumable data assets, and to reclassify which ones are for personal use and which ones are available for sale. In addition, if the book value is inconsistent with the tax basis, we need to confirm deferred income tax assets or deferred income tax liabilities to reflect the appreciation of data assets.

"Data asset confirmation, data revenue, and value recognition" are the measures of wealth distribution in the digital economy era. It is the transformation of previously ownerless data into owned means of production, and is a subversive new productive force and productive relationship change movement that is inevitable in human society.

We must use blockchain technology as the core of digital technology to change the production relationship of the traditional economy, allowing all data contributors such as creators, processors, and disseminators to confirm their contributions to the data and enjoy ownership, revenue, management, and other rights to their data. We need to change the traditional world where data aggregation platforms become the only beneficiaries of big data, and make all data contributors beneficiaries of the data. By confirming and valuing data assets, we can turn data into a type of asset, forming a new means of production for us.

Currently, with the rapid development of digital technology, countries all over the world attach great importance to the transformation of traditional economic systems by new technologies. In the future, the issuance of central bank digital currencies (CBDC) by governments will reconstruct a new global economic system.

**I. Data Asset Ownership**

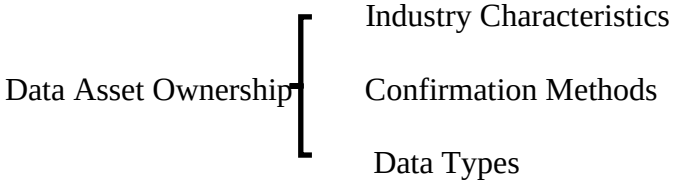
In this picture, where should the total value of global data assets be located, if it can be accounted for? This is a very important question for us to research, and it is also a problem that we should address in setting standards for data asset recognition and measurement.

According to the definition of "data assets" in Wikipedia, data assets are a set of data in cyberspace that have data ownership (exploration rights, usage rights, ownership), value, measurability, and readability. In 2009, Tony Fisher pointed out that data is an asset, and companies should treat data as an enterprise asset. In 2011, the World Economic Forum published a report "Personal Data: The Emergence of a New Asset Class," which pointed out that personal data is becoming a new economic "asset class." In July 2015, the Zhongguancun Data Asset Evaluation Center was established in Beijing, which is the first service organization in China to register and assign data assets, promote the ownership and value of big data as assets, and facilitate transactions. In April 2018, the Cloud Computing and Big Data Research Institute of the China Academy of Information and Communications Technology published the "Data Asset Management Practice White Paper (2.0 Edition)."

Data is defined as a new type of production factor in the digital age, alongside land, labor, capital, and technology. The value of data is becoming increasingly important!

Land has land ownership, labor has labor rights, capital has ownership rights, and technology has intellectual property rights. These four production factors have clear legal rights and responsibilities. However, for "data," the legal systems of different countries have not yet clearly defined the system of rights and responsibilities for data assets.

Today, we will study the issue of ownership and responsibility in data asset management. First, we need to clarify the three key elements of data asset ownership:




Currently, a data property rights system that regulates the order of transactions in the data market has not been established. Data asset ownership is one of the core issues that must be addressed for the application of big data and the development of the data industry. It clarifies the ownership of data from different sources in legal form, promotes data integration, accelerates data sharing and circulation, reduces transaction costs, thereby activating the enormous value and innovative applications of data assets, and enabling the rapid development of the data industry.

Blockchain technology can enable users to assert ownership over their data, meaning that their data assets can be mapped to unique owners on the internet and data value can be transferred. This means that data becomes a tangible asset with actual value. There are five roles in the data

circulation process: data producers, data managers, data storers, data sharers, and data users, and each role should have a different function in the data circulation industry. Only by using blockchain to assert ownership, can the foundation of data circulation be established. Therefore, blockchain technology is an ideal match for the era of data value sharing.

(I) Data ownership

Data ownership refers to the process of determining the legal rights and attributes of data, which mainly includes two aspects: first, determining the subject of data rights, that is, who has the right to data. Second, determining the content of the rights, that is, what kind of rights are enjoyed. Looking at these two aspects, data involves four main roles throughout its entire lifecycle from creation to destruction: data owners, data producers, data users, and data managers. And the process of establishing ownership is to define these four roles for specific data assets. In other words, the owners, producers, users, and managers of different data assets may be different.

a.Data Owner

The data owner refers to an organization or individual who owns or controls the data. The data owner is responsible for the data within a specific data domain, ensuring that the data within the domain can support cross-system and cross-business-line management. The data owner needs to lead or cooperate with the data governance committee to establish relevant data standards, data quality rules, data security strategies, and management processes. The data owner is generally composed of personnel from the relevant business departments of the enterprise. They execute data standards, optimize business processes, improve data quality, and unlock data value according to the enterprise's data governance strategy, data standards, and data governance rules. In the enterprise, the data owner is not the department that manages the database, but the main unit that produces and uses the data.

b. Data Manager

A data manager does not necessarily own the data, but is authorized by the data owner to manage it independently. In many traditional enterprises, data managers are often subordinate to data owners. Data managers do not handle all aspects of data governance and management, as some of these responsibilities need to be shared between the business and IT departments.

c.Data Producer

A data producer refers to the provider of data, which for a business may come from people, systems, and devices. For example, every attendance record of an employee, every bill generated by financial personnel, and every customer transaction can all be recorded. Enterprise resource planning (ERP), customer relationship management (CRM), and other systems generate large volumes of transaction and log data every day, while various types of devices in the enterprise continuously produce large amounts of data that are integrated into the enterprise's data platform through the Internet of Things (IoT).

d.Data User

A data user refers to an organization or individual that uses data, for example, by requesting, downloading, analyzing, or other means. In a business context, the data producer, owner, and user may be from the same department. For instance, the sales department, as the producer of customer data, can also use and own the data by relying on a CRM system.

(II) Why is data asset management subject to ownership confirmation?

In my opinion, there are three main reasons why data asset management needs to be subject to ownership confirmation:

a. Data ownership confirmation is the foundation of data asset management.

"Data assets are data resources that are legally owned or controlled by an organization and can bring economic and social benefits to the enterprise." This is the definition of data assets. From this definition, it is clear that for data to become an asset, there must be a clear ownership subject. From an accounting perspective, without clear data ownership, data assets will never enter the company's financial statements.

From a legal perspective, without clear data ownership, the problem of data misuse cannot be resolved.
From a data management and usage perspective, without clear data ownership, the issue of data quality cannot be traced and resolved.
b. Data ownership confirmation is a prerequisite for data trading and circulation.

Anything that is to be traded first needs to be confirmed of its ownership. Data is no exception! Due to the relatively low cost of data replication compared to production cost, data is easily copied and disseminated, resulting in situations where data users harm the rights and interests of data owners. Therefore, it is urgent to define data ownership reasonably. Only by clarifying the ownership of data can its value be evaluated, followed by trading and circulation.
c. Data ownership confirmation is an important means of protecting personal data security.

Due to the fact that data ownership has always been a vague issue, it is particularly prominent at the ToC end. With the large amount of data generated by internet users every day, the question arises as to whether the data belongs to the internet company or to the individual user. Legally speaking, personal information belongs to the individual, but in reality, we have never enjoyed the rights to own this data. Internet companies often claim ownership of the data generated by users through user agreements and personal information protection agreements. The lack of clear definition of data ownership has resulted in increasingly serious problems of information abuse, illegal data transactions and other violations of personal information.

(II) Data Ownership and Accountability

Data ownership and accountability is not a complex systems engineering project. It needs to be promoted with a clear goal, focus, scope, and targeted approach, in conjunction with an enterprise's data strategy, data standards, data management systems and processes, and IT system development. We need to pay attention to the following six "clarifications":
a. The accountability objectives should be clear, and data governance should run parallel to data ownership, reflecting the value and effectiveness of governance accountability.
b. The accountability scope should be clear, with a dual drive of "problem + value," giving priority to the management of data items that have frequent issues and significant impacts on business.
c. The accountability granularity should be clear, in terms of data granularity, specific to database, data table, or data field level; responsibility subject granularity, specific to department, position, or personnel level.
d. The accountability roles should be clear, defining who is the owner, producer, manager, and user of data in the value chain and lifecycle of data application.
e. The accountability responsibilities should be clear, coordinating with the accountability relationship matrix and CURD (Create, Update, Read, Delete), clearly defining who, in what system, operates what, and the operation standards.
f. The accountability mechanism should be clear, developing and publishing data standards, compiling data accountability management methods and processes, and simultaneously implementing data standards and management systems to ensure the normalization of data ownership and accountability operations.

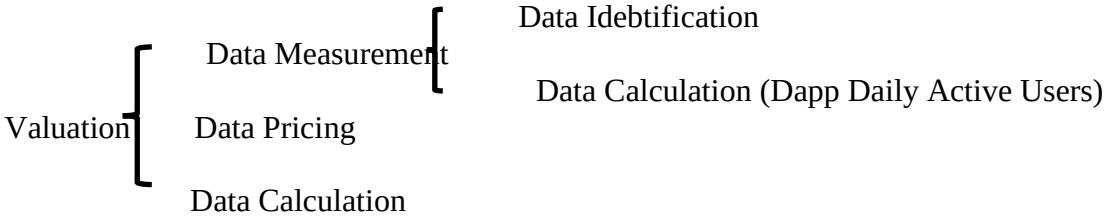
## II. Data Asset Valuation

After clarifying the issue of data ownership, it is necessary to consider how to evaluate the value of data to ensure that the collected data can maximize its value. This is what we call "confirming data revenue and value."

On the website Jian Shu, there is an article that proposes six models for evaluating the value of data assets, which are: intrinsic value, commercial value, performance value, cost value, economic value, and market value.

The work around data asset valuation mainly includes the following three aspects:

Data Asset




Theoretical and methodological research is important, but the focus of this article is on the indispensable value measurement of data assets once we delve into the 'confirmation of data benefits and value'. The determination of this measurement method is beneficial to the flow and utilization of assets."

**III. Measurement of Data Assets**

Based on long-term research in the field of data assets, we have pioneered the development of a formula for measuring the value of data assets, referred to as the "numeral weight formula". The formula is as follows:

$$V_D = \sum N_D \times P_A \times \gamma$$

VD (Value of Data Assets) refers to the value of data assets.

ND (Number of Daily average jumps) refers to the daily average active user count.

PA (Price of Data Assets) refers to the price of data assets of a certain type.

γ (Importance Coefficient) is the coefficient of importance, which takes into account the importance and weight of the industry category.

For example:

An Internet e-commerce company has 100,000 registered users, of which the average number of daily active users is 10,000, accounting for 80% of the platform's sales. According to the industry's internal evaluation standards, the value range of each active user is 5,000 to 10,000 yuan. Please calculate The data asset value of this platform enterprise?

$$VD = 10{,}000 \times 10{,}000 \times 100\% \times 80\% + (100{,}000 - 10{,}000) \times 5{,}000 \times 20\%$$

$$= 170{,}000{,}000$$

Therefore, we have calculated that the data asset value of this Internet e-commerce enterprise is 170 million yuan.

At the current research stage, we still have a series of issues to be improved specifically for data sampling and analysis work, including:

1. Confirming the types of data assets.
2. Reference for internal data weight in DAO.
3. Industry category importance coefficient table (research, calculation, and preparation).
4. Reference for data asset pricing strategy and price list (research, calculation, and preparation).

Finally, we hope to continuously improve our sampling data analysis and develop standardized references for data asset ownership and measurement. Through our research work, we aim to create new domains for asset development.

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