

THE ISSUES OF ACCOUNTING RECOGNITION AND MEASUREMENT OF PUBLIC DATA ASSETS

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Abstract: Public data constitute a critical component of China's data factor supply system, embodying substantial political, economic, and social value. However, existing accounting standards are insufficient to accommodate their unique characteristics. This study begins by clarifying the conceptual connotation of public data and defining public data assets within the accounting framework. From the perspective of administrative and public institutions, it explores the conditions for accounting recognition and the categorization of ownership of public data assets. Furthermore, it examines the accounting treatments involved in subsequent measurement processes, including initial recognition and amortization, subsequent expenditures, impairment, and disposal. The findings enrich the accounting framework for emerging asset types within governmental accounting theory and provide practical guidance for administrative and public institutions to enhance the management efficiency of public data assets and to promote the market-oriented circulation of data factors.

Keywords: Public data assets; Accounting recognition; Accounting measurement; Administrative and public institutions

1 INTRODUCTION

Public data, as a fundamental strategic resource of the nation, possesses high authority, accuracy, and reliability. It embodies significant political, economic, and social value, and its development and utilization have emerged as a new frontier in global data governance. On September 21, 2024, the General Office of the CPC Central Committee and the General Office of the State Council jointly issued the Opinions on Accelerating the Development and Utilization of Public Data Resources, which emphasizes the need to optimize the allocation of public data resources, unleash market-driven innovation, and fully leverage the amplifying, superimposing, and multiplying effects of data as a production factor. The document further underscores that these efforts aim to strengthen, enhance, and expand the digital economy, thereby providing a solid foundation for building new national competitive advantages. The role of public data assets has become increasingly prominent in enhancing government governance capacity, promoting the development of the digital economy, empowering the real economy, and safeguarding cybersecurity[1]. Consequently, the need for effective management and utilization of public data assets is becoming ever more urgent. However, the existing accounting standards provide only vague definitions of data assets. Traditional accounting rules, constrained by their reliance on the principles of scarcity and exclusivity, are insufficiently adaptable to the unique characteristics of public data—namely non-rivalry, shareability, non-exhaustibility, and timeliness. As a result, public data assets are difficult to be accurately and comprehensively represented in accounting measurement and reporting. Administrative and public institutions constitute the principal entities responsible for the generation of public data assets. Their institutional characteristics and governance mechanisms significantly influence the accounting treatment, management, and decision-making related to these assets. However, the absence of a unified accounting framework for recognition and measurement has hindered the market circulation and fair value realization of public data assets, thereby limiting their potential contribution to value creation in the digital economy. Accordingly, investigating the accounting recognition and measurement of public data assets within administrative and public institutions has emerged as a critical agenda in contemporary accounting research under the digital economy paradigm.

2 LITERATURE REVIEW

The Enterprise Accounting Standards define assets as: "Resources arising from past transactions or events of an enterprise, owned or controlled by the enterprise, and expected to provide future economic benefits to the enterprise." Data assets can be analyzed based on their data sources, legal attributes, and economic attributes[2]. Under the perspective of source attribution, data resources serve as the foundational inputs for the formation and capitalization of data assets[3]. Given the inherent difficulty in tracing the circulation and ownership chain of data resources, the verification of data provenance legitimacy constitutes an essential procedure in the accounting recognition process of data assets[4]. Nevertheless, for fully open public data, concerns regarding the legality or compliance of data sources are generally immaterial. For conditionally accessible and exploitable data, authorization is generally granted by governmental or other public institutions to enterprises for operation, or through the execution of licensing agreements, thereby ensuring the legitimacy of data provenance. From the perspective of legal attributes, this process represents an exploration of data asset property rights. Current theoretical approaches to data property rights can be broadly

categorized into three paradigms: the Utility Theory, the Empowerment Theory, and the Structural Theory[5]. The “Pragmatic Approach” adheres to the fundamental tenets of pragmatism[6]. Its core argument posits that when data ownership cannot be appropriately interpreted within the current legal framework, it is advisable to temporarily bypass the ownership issue and instead focus on the expected outcomes of the property rights system design[7]. Accordingly, data rights should transcend the traditional conception of property rights and emphasize the interactive relationships of interests among participants in the data factor market. The “Empowerment Approach,” by contrast, argues that existing categories of property rights are not directly applicable to data[8]. It therefore advocates the establishment of new proprietary rights or the granting of limited exclusivity to data. The “Structural Theory” posits that data rights possess a complex property-rights structure, thereby necessitating the construction of models such as a “bundle of rights.” From an economic attributes perspective, the notion that data embody value has been widely acknowledged[9]. Considering the circulation of data as a production factor, data assets can be categorized into “resource-based data assets” and “operational data assets.” The former refers to data assets that have potential development value but have not yet entered market circulation and generally lack specific application scenarios, whereas the latter refers to data assets that have been productized and are tradable in the market[10].

The accounting recognition of public data assets can be explored with reference to the relevant accounting standards, according to the classification and ownership of data asset items. Current research on the attribution of data assets mainly presents four perspectives[11]. The first view holds that data assets share similar characteristics with other productive assets, as they are generated in the course of production and can be repeatedly utilized over the long term to generate economic benefits for entities; therefore, they may be accounted for as fixed assets[12]. However, this perspective overlooks the non-depletive and replicable nature of public data assets. Public data assets can be utilized an unlimited number of times and may even appreciate in value through repeated use, which marks a substantial distinction in their economic substance. A second view contends that data assets are held for sale or for consumption in the course of future operations, and therefore can be accounted for as inventories[13]. Nevertheless, the low frequency of data asset sales and transactions does not constitute ordinary activities of the entity, thus creating a conceptual inconsistency with the definition of inventories under accounting standards. Third, some scholars argue that data assets possess the identifiable and non-physical characteristics of intangible assets and therefore should be recognized as such. However, while intangible assets typically emphasize exclusive control and legal enforceability, the value of data assets lies in their capacity for sharing and circulation[14]. This divergence in attributes leads to inconsistencies in the accounting recognition and measurement logic.

Research on the measurement of public data assets remains limited; however, it can draw on the existing approaches to accounting measurement of data assets. Current studies on data asset measurement present relatively fragmented perspectives, which can be summarized as follows. First, the valuation of data assets is highly context-dependent, as their value varies significantly across application scenarios. Accordingly, the transaction price of a data asset can be regarded as a reflection of its value in a single exchange[15]. Second, both the market approach and the income approach are subject to stringent applicability conditions, making the cost approach a more prudent method for accounting measurement of data assets. Third, fair value is currently considered the most reliable representation of the actual value of data assets[16]. Nevertheless, given the inherent difficulty in determining their useful life, subsequent measurement should not involve amortization. In adherence to the principle of prudence, entities should perform an annual impairment test for data assets at the end of each fiscal year. Fourth, a combined application of the cost approach and fair value measurement is recommended to provide a more comprehensive representation of data asset value[17].

In summary, existing studies have explored data asset accounting from multiple dimensions, yet there remain notable divergences regarding the accounting recognition and measurement of data resources. Research specifically focusing on the accounting treatment of public data assets remains limited. This paper begins by examining the connotation of public data, further clarifying the concept of public data assets and their accounting recognition criteria. It then analyzes the accounting measurement and bookkeeping treatments involved in the acquisition, amortization, subsequent expenditures, impairment, and disposal of public data assets within administrative and public institutions. The objective is to effectively reflect the value and management of public data assets, thereby providing robust accounting support for decision-making in public sector entities.

3 PUBLIC DATA ASSETS

3.1 Public Data

Public data initially manifests as government data and administrative data, reflecting the primary attributes of public institutions and the nature of their administrative functions. With the deepening advancement of China's data circulation strategy, the concept of public data has expanded beyond the traditional understanding of “publicly owned” data to encompass “data possessing public value.” Data from enterprises, institutions, and social organizations is gradually being incorporated into the scope of public data openness regulations. However, a unified definition of “public data” has yet to be established. Currently, the definition of public data primarily encompasses three dimensions. First, some regulations define it based on its inherent characteristics. For instance, the Beijing Municipal Measures for the Administration of Public Data define public data as “various types of data recorded and stored through computer information systems that possess public utility value and do not involve state secrets, trade secrets, or personal privacy.” Second, other frameworks delineate public data by ownership and source of generation. The Provisional

Measures of Zhejiang Province for the Opening and Security Management of Public Data define public data as “data resources obtained by administrative authorities at all levels and public institutions with administrative or service functions in the lawful performance of their duties.” Third, certain jurisdictions further refine the scope of data-holding entities. The Implementation Rules of Shanghai Municipality on Public Data Opening explicitly include “organizations providing public utilities such as water supply, electricity, gas, and public transportation.” Based on a comprehensive review of current regional policies and accounting standards, and in alignment with the evolving policy trend of data factor circulation in China, this study defines public data as various categories of data resources collected or generated by administrative and public institutions in the course of performing public governance functions or delivering public services.

3.2 Public Data Assets

According to Document Caihui [2023] No. 11 issued by the Ministry of Finance, Notice on the Issuance of the Provisional Regulations on Accounting Treatment Related to Corporate Data Resources (hereinafter referred to as the “Provisional Regulations”), enterprises are required to conduct relevant accounting treatment for “data resources that are recognized as intangible assets, inventories, or other asset categories in accordance with the Accounting Standards for Business Enterprises (ASBEs), as well as data resources that are legally owned or controlled by the enterprise and are expected to bring future economic benefits but are not recognized as assets because they fail to meet the recognition criteria stipulated in the ASBEs.” Therefore, the recognition of data resources as data assets must satisfy the definition of an asset under the Basic Standard of the Accounting Standards for Business Enterprises, along with two specific conditions: (1) it is probable that future economic benefits associated with the resource will flow to the enterprise; and (2) the cost or value of the resource can be measured reliably. Data assets that meet this definition are limited to data products and source datasets embedded in data products. The term data products refers to product forms that are designed for specific application scenarios and require embedded data to provide services. During the processes of data acquisition, data asset management, and data asset operation, such data products are generated through the processing of computing power and algorithms, forming data outputs that deliver services to end users.

The key to defining public data assets lies in how the term “public” is conceptualized. Within the composition of data products, the embedded data sources are inherently diverse, encompassing public data, social data, or a combination thereof, and in some cases consisting solely of one type. However, whether a data product falls within the “public” domain cannot be determined solely based on the nature of the embedded data. Instead, the decisive criterion should be the ownership attribution of the data product. Specifically, when a data product is independently developed by a public sector entity or developed by a third party under commission but with ownership vested in the public sector entity, it should be recognized as a public data product, irrespective of whether the underlying data possess “public” attributes. Accordingly, public data products refer to those data products that are developed or commissioned by administrative or public institutions, using fiscal funds or under government-granted concessions, in the course of performing public management functions or delivering public services. Public data products not only generate inflows of economic benefits for specific entities but also possess substantial potential for administrative and service functions, thereby creating political, social, and other multidimensional values. According to the Ministry of Finance Document No. 141 [2023], Guidelines on Strengthening Data Asset Management, the definition of public data assets extends beyond the criterion of “generating economic benefits” to include “the potential to produce administrative and service functions.” Public data assets represent the assetized form of public data, encompassing public data products, public datasets embedded within such products, as well as public datasets incorporated into other data products. Accordingly, this study defines public data assets as data resources formed by administrative or public institutions in the course of performing statutory duties or delivering public services, which are held or controlled by specific entities and are expected to generate either administrative and service potential or inflows of economic benefits.

3.3 Characteristics of Public Data Assets

Public data assets differ fundamentally from traditional assets, exhibiting distinct characteristics such as non-rivalry, non-excludability, temporality, non-depletability, and value indeterminacy. Non-rivalry implies that a given public data asset can be simultaneously utilized by multiple users without diminishing its usability or economic utility. Non-excludability indicates that the utilization of such assets does not preclude other potential users, thereby reflecting their inherent public accessibility and shared nature. Temporality refers to the extent to which public data assets accurately and promptly reflect real-world phenomena or events. Non-depletability denotes that the use of public data assets does not entail physical deterioration or economic depletion arising from their consumption. Value indeterminacy signifies that the value of public data assets is not static; it may appreciate as application scenarios expand and data analytics technologies advance, or depreciate rapidly due to data obsolescence, technological innovation, or shifts in market demand—potentially resulting in complete loss of value.

In addition, public data assets exhibit distinct characteristics. First, public data assets are inherently multi-sourced, involving participation from diverse stakeholders, where openness and exclusivity coexist. During the processes of data collection, processing, and utilization, multiple entities—such as government and public institutions, social organizations, corporate bodies, and individuals—contribute to their formation. In some cases, these assets may even originate from confiscations, donations, or other non-market transactions. Second, public data assets embody both

scarcity and authority. Although they are characterized by large volume and extensive coverage, each professional domain contains unique and domain-specific datasets. The difficulty of acquisition, high processing costs, and restricted applicability in certain use contexts lead to relative scarcity and heightened value in specialized data categories. Public data assets are typically acquired by governmental and public institutions in accordance with legal and regulatory requirements, ensuring both compliance and validity. The management of public data assets adheres to standardized governance frameworks, under which data ownership, processing, and operation are implemented by specialized agencies. Such structured and regulated procedures ensure the authority and reliability of data, thereby enhancing the credibility and recognition of public data assets. Third, public data assets exhibit a high degree of sensitivity. They encompass information across diverse dimensions of social production and everyday life, including personal privacy data, corporate trade secrets, and information involving public or national interests. As a result, public data assets are characterized by substantial sensitivity and require stringent controls over access and disclosure. Fourth, public data assets embody multi-dimensional and integrated value attributes. Their utilization and development should reflect both economic and social benefits. At the macro level, public data assets support national reform and development strategies, facilitating the modernization and digital transformation of government governance. At the meso level, public data provides decision-making references for relevant authorities in formulating industrial policies and implementing sectoral regulation, contributing to structural adjustment and optimized resource allocation. At the micro level, public data serves as an operational resource for enterprises, guiding market expansion, managerial decision-making, and internal governance, thereby promoting sustainable corporate development.

4 ACCOUNTING RECOGNITION OF PUBLIC DATA ASSETS IN ADMINISTRATIVE AND PUBLIC INSTITUTIONS

4.1 Accounting Recognition Criteria for Public Data Assets of Administrative and Public Institutions

4.1.1 *Public data assets have clear sources*

Public data assets originate from past transactions or events that occur in the process of administrative and public institutions performing their statutory duties or delivering public services. Specifically, public data are obtained by these institutions, through legally prescribed procedures, from designated entities in the course of fulfilling their functions. Such data primarily fall into the following five categories. The first category comprises governmental data, referring to information collected or obtained by public authorities in the lawful performance of their administrative duties. The second category includes data generated, collected, and held by public service and administrative entities, such as state-owned enterprises or public institutions, in the course of delivering their mandated functions. The third category pertains to data gathered or acquired by specialized institutions financed by public funds, which operate in areas involving public interest and thus possess inherent public value. The fourth category covers data owned by social organizations with public management or service attributes, where the information is closely related to major public interests. The fifth category encompasses other types of data associated with public service domains. All of the above categories generally originate from past transactions or events supported by verifiable documentation, ensuring the traceability, reliability, and authenticity of public data sources.

From the perspective of public data supply, administrative and public institutions, as the primary entities responsible for data collection, undertake critical duties in the provision of data. They are accountable for the hierarchical classification and governance of data generated and collected in the course of fulfilling their administrative functions, thereby ensuring the accuracy and integrity of such data. Specifically, Big Data Centers act as data aggregators, integrating massive volumes of public data resources within a given region or sector to construct comprehensive data resource maps. Meanwhile, data regulatory authorities are responsible for coordinating the unified construction of regional public data catalogues, formulating the public data directory, and ensuring the compliant utilization and effective management of public data resources. From the perspective of data circulation, data operating entities conduct authorized data operations in accordance with the relevant procedures and provisions stipulated in the Administrative Measures for the Authorized Operation of Public Data. In practice, they adhere to the principle of "data availability without visibility," ensuring that raw data remain within jurisdictional boundaries while being made usable for authorized applications. These entities further engage in the development of public data products under such regulatory constraints. During the circulation process, data regulatory authorities, Big Data Centers, and data source institutions are responsible for supervisory and compliance functions, including the qualification review of operating entities, approval of data utilization, oversight of data development and application, as well as the supervision of market exit mechanisms for operators. Collectively, these governance measures provide a framework for compliance disclosure and full-process supervision, thereby supporting the assetization and accounting recognition of public data resources.

4.1.2 *Held or controlled by a specific entity*

The ownership of public data assets, held or controlled by specific entities, is a matter of discussion. Public data assets differ significantly from traditional assets, exhibiting characteristics such as non-rivalry, non-exclusivity, time-sensitivity, and non-depletion. Traditional property rights concepts are difficult to fully apply. Public data assets exhibit greater multi-sourced origins, with rights trends becoming increasingly relative and diversified. A single statutory ownership framework struggles to comprehensively regulate data ownership relationships. The Central Committee of the Communist Party of China and the State Council issued the "Opinions on Establishing a Basic Data System to Better Leverage the Role of Data as an Economic Factor," exploring a data property rights framework based

on the "three-rights separation" model: data resource holding rights, data processing and usage rights, and data product operation rights. Data resource ownership refers to the rights held by relevant entities to manage, utilize, derive benefits from, and dispose of data resources within the scope prescribed by laws, regulations, or contracts. It constitutes a form of relative possession, distinguished by the ability of multiple entities to simultaneously hold such rights without interfering with each other's use of the data. Data processing and utilization rights refer to the entitlement of relevant entities to employ various methods and technical means to collect, utilize, analyze, and process data, subject to compliance with applicable laws, regulations, or contractual agreements. By exercising these rights, entities can conduct in-depth mining and processing of raw data, transforming it into more valuable information formats tailored to specific needs, thereby further unlocking the latent potential of data. Data product management rights refer to the rights of relevant entities to possess, use, derive benefits from, and dispose of data products within the constraints of relevant laws, regulations, or contracts. Through these rights, entities can bring processed data products to market, engage in commercial operations, and realize data value. For public data assets, administrative institutions and other organizations, as the collectors and controllers of public data resources, possess relatively clear "ownership" rights over such resources, making it easier to meet asset recognition standards. However, the exercise of "usage rights" and "operating rights" for public data assets is more complex. When processing, utilizing, or publishing public data, data operators should establish contractual mechanisms through negotiations with administrative institutions. These agreements should include background and qualification reviews of authorized entities to verify their operational history, data security credentials, operational risks, and foreign investment risks. Additionally, the agreements must explicitly state that data processing activities are conducted under the unified arrangements of administrative institutions, thereby constraining the authorized entity's identity, the scope of data, and the purpose of data processing. Such agreements should also clearly define the protection obligations of all parties involved in public data processing activities. Public data assets must be supervised and managed in accordance with relevant laws and regulations, such as the Data Security Law, to safeguard public interests. However, public data involving national security-sensitive areas, while potentially qualifying as public data assets under certain conditions, cannot be disclosed and ultimately cannot be included in the balance sheet.

From a practical perspective, public data assets in administrative and public institutions primarily involve the following four types of entities. First, industry regulatory authorities and supervisory agencies. Local government public data regulatory bodies are generally big data authorities, such as Big Data Bureaus or Government Data Bureaus, though in some regions they may fall under departments like Industry and Information Technology, Economic and Information Technology, or Cyberspace Administration. With the establishment of the National Data Administration, public data management responsibilities will gradually be consolidated under local big data authorities. Second, public functional departments and institutions. These data source entities, including public functional departments and relevant public institutions, are responsible for providing public data resources in accordance with laws and regulations. They bear accountability for the quality and security of the public data they supply. Third, authorized operating entities. As publicly-owned means of production belonging to the entire population, public data is managed by government departments. The preferred approach involves entrusting public data to public institutions or local state-owned enterprises for market-oriented operations. Authorized entities undertake the development, maintenance, and daily management of public data operation service platforms, engage in demand communication with data users, and facilitate the provision of data products and services. Fourth, public data users. Users must adhere to the scope of data usage stipulated in agreements or contracts, and are prohibited from transferring acquired data to third parties, whether for compensation or gratuitously. They assume obligations to safeguard public data security and must accept the tracking, evaluation, and supervision of their public data utilization activities by government departments and public data providers.

4.1.3 Costs or values can be reliably measured

For administrative and institutional units, determining the cost or value of public data assets must be based on verifiable evidence. Throughout the processes of data collection, management, storage, and development, detailed records of labor, material, and financial inputs are typically maintained and supported by vouchers such as invoices, contracts, and payroll records. In some instances, however, it is necessary to make a reasonable estimate of the cost or value of public data assets based on the most current information available. From an accounting perspective, the measurement of cost or value for public data assets held by administrative units can draw on traditional asset valuation methodologies, primarily encompassing the income approach, market approach, and cost approach. The core logic of the income approach is to estimate a reasonable value by discounting the expected economic benefits derived from potential future applications of the public data assets. Theoretically, this method is suitable for public data assets with well-defined usage scenarios and quantifiable future economic benefits. However, public data assets often exhibit multi-dimensional value integration, with social effects that are difficult to quantify, and their value may be subject to significant uncertainty, limiting the applicability of this approach. The market approach estimates the value of target public data assets by referencing recent transaction prices of comparable or similar public data assets in the open market. When a sufficiently rich variety of public data transaction types and models exists, enabling the collection of relevant comparable indicators, the market approach can be more appropriate. Nevertheless, the value of public data assets is highly dependent on specific application scenarios, and their characteristics—such as sensitivity and non-competitiveness—make it challenging to find truly comparable or similar public data assets in the market. The cost approach primarily refers to measuring the value of public data assets by aggregating the various costs incurred throughout the data production process, including acquisition costs, processing costs, operational and maintenance costs,

administrative costs, and security-related costs. At present, valuation techniques for public data assets based on the cost approach have matured. The consumption of hardware, software, and human resources during standardized processes—such as data collection, storage, cleaning, and anonymization—can be accounted for with relative clarity. Since these processes typically do not involve customized development tailored to specific applications, the potential for extracting additional value from public data resources is limited, thereby ensuring high measurement accuracy. From a prudence perspective, adopting the cost approach as the measurement basis is generally reasonable for most public data assets.

4.1.4 Expected to generate management service potential or bring in economic benefits

Circular No. 141 [2023] of the Ministry of Finance, "Notice on Issuing the Guiding Opinions on Strengthening Data Asset Management," expands the definition of public data assets. Beyond "generating economic benefits," it adds "possessing the potential to deliver management services." The value of public data assets extends beyond economic returns, broadly manifesting in their capacity to propel social progress and enhance the service efficacy of modernized government governance. This encompasses multifaceted value attributes spanning political, social, and other dimensions. Economically, public data assets leverage open sharing and market-oriented operations to provide continuous "data momentum" for the digital economy. This drives industrial development, generates direct economic benefits for specific entities, and optimizes internal operational processes—enhancing efficiency and reducing costs—thereby creating indirect economic value. From a social perspective, developing and utilizing public data assets helps drive social innovation, spawning new knowledge and products that enhance the quality of public services, improve people's well-being, and realize social value. Furthermore, public data assets play a crucial role in advancing the modernization of government governance, enhancing the scientific basis of decision-making, and boosting government credibility. As the construction of digital government continues to advance, its political value is becoming increasingly prominent. Whether public data can realize its management and service potential or generate economic returns depends on different value realization scenarios, primarily including: First, application scenarios that directly generate economic returns through market-oriented operations and authorized usage; Second, application scenarios that indirectly create economic value by improving administrative efficiency and reducing operational costs; Third, social value scenarios that empower enterprises and the public through open sharing, optimize public service processes, and enhance service quality; Fourth, political value scenarios that elevate government governance standards and decision-making scientificity.

4.2 Scope of Ownership for Public Data Assets of Administrative and Public Institutions

Regarding the attribution of public data assets, their classification can be explored by referencing relevant accounting standards based on the nature of the data asset. The Interim Provisions treat data resources used internally by enterprises as inventories, while data resources intended for external transactions are recognized as intangible assets. Inventory refers to finished goods or merchandise held for sale in the ordinary course of business, products in the process of production, and materials consumed during production or the provision of services. First, inventory originates from routine business activities and possesses high liquidity and realizable value. Public data assets, however, are infrequently sold or exchanged and therefore do not qualify as part of an entity's ordinary operating activities. Second, the purpose of holding inventory by a specific entity is for consumption or sale in the ordinary course of business. Whether an asset qualifies as inventory depends primarily on its intended use in routine operations. If an asset is held not for consumption or sale in ordinary activities, even if it exhibits inventory-like characteristics, it does not meet the definition of inventory and cannot be accounted for as such. Public data assets are, by nature, processed and structured data derived from massive information sources, providing targeted analytical value and reflecting political, economic, and social significance. They are not directly consumed or sold, and thus do not satisfy the definition of inventory or accurately reflect the status of public data assets held by administrative and institutional units. Intangible assets refer to identifiable non-monetary assets without physical substance that an entity controls or owns. They typically embody rights, patents, or comprehensive capabilities that enhance service potential, but lack physical form. Public data assets, however, are generated through collection, organization, and analysis processes and can be shared, transmitted, or transacted. Their storage requires information system media, and their characteristics—including non-competitiveness, non-exclusivity, shareability, and non-consumptiveness—render them incompatible with the existing intangible asset accounting framework. Accordingly, it is recommended that administrative and institutional units establish a separate accounting subject for "Public Data Assets," enabling independent recognition and measurement of the public data assets held, and reporting them separately on the balance sheet.

5 ACCOUNTING MEASUREMENT OF PUBLIC DATA ASSETS IN ADMINISTRATIVE AND PUBLIC INSTITUTIONS

In the economic transaction processing of administrative and institutional units, the Government Accounting System provides a clear framework and guidance for accounting practice, characterized by the distinctive features of "dual functions, dual bases, dual elements, and dual reporting." Specifically, it implements both budgetary accounting and financial accounting functions, applies the cash basis for budgetary accounting and the accrual basis for financial accounting, recognizes dual accounting elements for both budgetary and financial accounts, and requires the preparation of both final budget reports and financial statements at the end of the period. Budgetary accounting focuses on the

management of budgetary fund inflows and outflows, reflecting budget execution and providing a basis for budget formulation and adjustment. Financial reporting, in contrast, emphasizes the presentation of an entity's financial position and operational performance, supporting financial decision-making and management. Under a comprehensive budget management framework, the accounting system of administrative and institutional units not only records financial information regarding economic events but also processes budgetary information. Together, financial and budgetary information constitute the accounting measurement basis for public data assets, ensuring the completeness and consistency of accounting information. This dual accounting system enables administrative and institutional units to monitor budget execution more effectively, optimize resource allocation, enhance operational efficiency, and provide reliable financial evidence for both external oversight and internal decision-making.

5.1 Accounting Measurement Model for Public Data Assets in Administrative and Public Institutions

Currently, the measurement of data assets primarily considers three valuation models: fair value, present value, and historical cost. The fair value measurement model is capable of reflecting the true economic value of public data assets, exhibits strong timeliness, and aligns closely with the intended usage scenarios of these assets. However, in China, both the activity level and transparency of the data trading market remain limited, making it difficult to identify identical or comparable transactions for public data assets in an open market. Consequently, fair value is currently not suitable for measuring public data assets held by administrative and institutional units. The present value approach estimates the value of an asset by discounting its expected future cash flows at an appropriate discount rate, which can capture the prospective economic benefits of public data assets. Nevertheless, this method is subject to significant subjectivity and potential measurement inaccuracies, raising the risk of overstatement in the valuation of public data assets. Moreover, public data assets possess unique characteristics, and the future value they generate under current conditions is inherently difficult to quantify reliably in monetary terms, which further complicates precise measurement.

Historical cost represents the total expenditure incurred by an accounting entity to acquire or create an asset. Measurement at historical cost provides an objective and faithful representation of the acquisition cost of public data. For administrative and institutional units, whether public data assets are internally developed or externally purchased, the associated costs can be reliably determined, minimizing biases arising from subjective judgment. These units are also actively exploring the establishment of a public data cost accounting system, which comprehensively considers factors such as data collection, storage, processing, and management, and applies a classified cost accounting approach. Under the guidance of sectoral authorities, pricing regulators, and fiscal departments, and with reference to relevant charging standards and procedures, regional standards for public data usage fees are formulated. Therefore, under current data market conditions and considering practical operability, historical cost measurement can be applied to public data assets, supporting the principle of prudence and ensuring the reliability of accounting information.

Furthermore, when the cost of public data assets cannot be reliably determined and their objective value cannot be reflected, the measurement of such assets may refer to the accounting approach applied to historical artifacts, namely a dual measurement method combining nominal amounts and physical units. The Government Accounting Standards – Basic Standards stipulate that “the measurement attributes of assets primarily include historical cost, replacement cost, present value, fair value, and nominal amount... where none of the above measurement attributes can be applied, assets shall be measured at nominal amount (i.e., RMB 1).” This provision provides an effective reference for administrative and institutional units in addressing the challenge of quantifying the value of public data assets upon acquisition.

5.2 Initial Measurement of Public Data Assets

The initial measurement of public data assets primarily concerns the acquisition of such assets. Administrative and institutional units acquire public data assets through several main channels, including self-development, purchase, donation, gratuitous transfer, and commissioning other entities for development. First, self-development. Public data resources must undergo multiple processes—collection, organization, processing, storage, management, and application—before they can constitute valuable public data assets. Therefore, expenditures incurred by administrative and institutional units in self-developing public data assets should be distinguished between expense recognition and capitalization phases. Expenditures classified as expenses are recorded under the account “Public Data Development Expenditure” and are fully transferred to current period expenses at the end of the period. Expenditures classified as capitalizable costs are initially recorded under “Public Data Development Expenditure” and transferred to the “Public Data Assets” account upon reaching the intended usable state. If it is not possible to distinguish between expense and capitalization, but the public data asset has been legally obtained according to relevant procedures, the total expenditure is directly recognized under “Public Data Assets.” Second, purchase, donation, or gratuitous transfer. Public data assets acquired through purchase, donation, or gratuitous transfer are recognized at their determined cost and recorded under “Public Data Assets.” If the donation is recognized at a nominal value, the asset is recorded at the nominal amount. Third, commissioned development by other entities. Public data assets commissioned to third parties for development are treated similarly to purchased assets. However, if the contract stipulates advance payments for development, the advance is recorded under “Prepaid Expenses.” Upon completion and delivery of the developed public data asset, and payment of the remaining or total development fees, the total development cost is recognized under “Public Data Assets.” Specific accounting treatments are summarized in Table 1.

Table 1 Accounting Treatment for Acquisition of Public Data Assets

Business and Matters		Financial Accounting	Budget Accounting
In-house development	Expenses for self-developed projects	Debit: Public Data Development Expenditures Credit: Employee Compensation Payable / Government Grant Income, etc. Debit: Operating Expenses / Administrative Expenses, etc. Credit: Public Data Development Expenditures	Debit: Operating Expenses/Business Expenses, etc. Credit: Budgeted Revenue from Government Appropriations/Fund Balances
	Capitalized expenditures for self-developed projects	Debit: Public Data Development Expenditures Credit: Employee Compensation Payable / Government Grant Revenue, etc.	Debit: Operating Expenses/Business Expenses, etc. Credit: Budgeted Revenue from Government Appropriations/Fund Balances
	Development completed, achieving the intended purpose and forming a public data asset.	Debit: Public Data Assets Credit: Public Data Development Expenditures	No accounting entries
	Unable to distinguish between expenses and capital expenditures, but public data assets have been acquired in accordance with relevant legal procedures. .	Debit: Public Data Assets Credit: Fiscal Appropriations Received / Bank Deposits, etc.	Debit: Operating Expenses/Business Expenses, etc. Credit: Budgeted Revenue from Government Appropriations/Fund Balances
Purchased externally	Costs determined by external procurement	Debit: Public Data Assets Credit: Fiscal Appropriations Receivable/Accounts Payable/Bank Deposits, etc.	Debit: Program Expenses/Operating Expenses/Administrative Expenses, etc. Credit: Budgetary Revenue from Government Appropriations/Fund Balances
Accepting donations	Costs determined upon acceptance of donations	Debit: Public Data Assets Credit: Bank Deposits, etc. Donation Income	Debit: Other Expenses Credit: Fund Balance
	Record at nominal value	Debit: Public Data Assets Credit: Donation Revenue Debit: Other Expenses Credit: Bank Deposits, etc.	Debit: Other Expenses Credit: Fund Balance
Transfer without compensation	Costs determined for non-reimbursable transfers	Debit: Public Data Assets Credit: Bank Deposits, etc. Net Assets Transferred Without Consideration	Debit: Other Expenses Credit: Fund Balance
Outsource development to other entities	Prepay development fees as stipulated in the contract	Debit: Prepaid Accounts Credit: Government Grants Received / Cash on Hand, etc.	Debit: Program Expenses/Operating Expenses/Administrative Expenses, etc. Credit: Budgetary Revenue from Government Appropriations/Fund Balances
	Public Data Asset Delivery, Payment of Remaining or Full Development Fees	Debit: Public Data Assets Credit: Prepaid Accounts Government Grants Received / Bank Deposits, etc.	Based on the amount of remaining funds paid: Debit: Program Expenses/Operating Expenses/Administrative Expenses, etc. Credit: Budgetary Revenue from Government Appropriations/Fund Balances

5.3 Subsequent Measurement of Public Data Assets

5.3.1 Amortization

Public data assets typically generate benefits for administrative and public institutions over a period exceeding one year and may be classified as long-term assets. However, public data assets also exhibit significant time-sensitivity, with their value or rights potentially expiring or diminishing due to changes in intended use or external circumstances.

Therefore, administrative and public institutions should reasonably estimate the expected useful life of public data assets upon acquisition. Where the useful life cannot be foreseen, such assets should be treated as public data assets with an indefinite useful life. Administrative and public institutions shall amortize public data assets with a determinable useful life, allocating the cost to relevant expenses or current period costs based on their intended use. Public data assets with an indefinite useful life, those fully amortized but still in use, and those measured at nominal value shall not be amortized. No accounting entries shall be made in budget accounting. Specific accounting treatments are shown in Table 2.

Table 2 Accounting Treatment for Amortization of Public Data Assets

Business and Matters	Financial Accounting	Budget Accounting
Amortization of public data assets	Debit: Operating Expenses/Unit Administrative Expenses, etc. Credit: Accumulated Amortization of Public Data Assets	No accounting entries

5.3.2 Subsequent expenditures

Public data assets are characterized by non-consumability and replicability, and their value may appreciate during future use. When the value of public data assets increases significantly due to expanded application scenarios, technological advancement, or enhanced utilization efficiency, such appreciation should be recognized. Value appreciation can be realized by remeasuring the public data asset and adjusting its carrying amount. The increment may be recorded in the “Provision for Appreciation of Public Data Assets” account, while also assessing whether subsequent expenditures meet the recognition criteria for public data assets. Specifically, amortization of the public data asset is temporarily suspended. The carrying amount of the public data asset is recorded in the “Provision for Appreciation of Public Data Assets” account, and the amount already amortized is recorded in the “Accumulated Amortization of Public Data Assets” account. Subsequent expenditures that meet the recognition criteria for public data assets are recorded in the “Provision for Appreciation of Public Data Assets” account at the amount incurred. Upon completion of the appreciation process and delivery of the suspended-amortization public data asset for use, the balance in the “Provision for Appreciation of Public Data Assets” account is transferred to the “Public Data Assets” account. Expenditures that do not meet the recognition criteria for public data assets should be expensed and recorded under accounts such as “Operating Expenses” or “Administrative Expenses.” The detailed accounting treatment is presented in Table 3.

Table 3 Accounting Treatment for Subsequent Expenditures on Public Data Assets

Business and Matters	Financial Accounting	Budget Accounting
Subsequent expenditures meeting the criteria for public data asset recognition	Debit: Public Data Appreciation Reserve Public Data Accumulated Amortization Credit: Public Data Assets Debit: Public Data Appreciation Reserve Credit: Government Grants Received/Bank Deposits, etc.	Debit: Program Expenses/Operating Expenses/Administrative Expenses, etc. Credit: Budgetary Revenue from Government Appropriations/Fund Balances
Achieve value-added transformation to fulfill intended purposes and establish public data assets.	Debit: Public Data Assets Credit: Public Data Appreciation Reserve	No accounting entries
Subsequent expenditures that do not meet the criteria for public data asset recognition	Debit: Operating Expenses/Unit Administrative Expenses, etc. Credit: Government Grants Received/Bank Deposits, etc.	Debit: Program Expenses/Operating Expenses/Administrative Expenses, etc. Credit: Budgetary Revenue from Government Appropriations/Fund Balances

5.3.3 Impairment

The Government Accounting Standards—Basic Standards stipulate that to accurately reflect the financial position of government entities, public institutions must conduct a comprehensive review of accounts receivable and other receivables not required to be remitted to the treasury at the end of each year, in accordance with the principle of prudence. They must assess the likelihood of recovery and recognize bad debt losses by accruing provisions for anticipated bad debt losses. Other assets are not required to be impaired temporarily. Therefore, public data assets should not be subject to impairment provisions. However, the value of public data assets is highly correlated with usage scenarios, timing, and other factors, making them susceptible to value fluctuations influenced by internal and external environmental factors affecting users. If annual impairment testing cannot be conducted, administrative and public institutions should perform a value assessment of public data assets at the end of each year and disclose the results of such assessments in their financial reports. This ensures users of financial reports have a full understanding of the financial status of public data assets.

5.3.4 Disposal

The disposal of public data assets by administrative and institutional units primarily includes methods such as sale, transfer, external donation, gratuitous allocation, and write-off upon approval. According to regulations, approved disposals of public data assets are recorded at the carrying amount of the disposed assets and recognized in the “Gains or Losses on Asset Disposal” account. For assets that have been amortized, the remaining balance is credited to the “Public Data Assets” account. Any expenses incurred during the disposal process are recorded in accounts such as “Cash and Cash Equivalents.” In cases where an administrative or institutional unit transfers public data assets upon approval, and the transfer involves copies of public data products while the unit retains the underlying rights to use the public data resources, the cost of the disposed public data asset is allocated proportionally based on the transfer revenue relative to the total expected economic benefits generated by the asset. The specific accounting treatment is summarized in Table 4.

Table 4 Accounting Treatment for Public Data Asset Disposal

Business Matters	and	Financial Accounting	Budget Accounting
Sale, Transfer		Debit: Asset Disposal Expense	
		Accumulated Amortization of Public Data Assets	No accounting entries
		Credit: Public Data Assets	
		Debit: Bank deposits, etc.	If transfer income is included in the unit's budget as required:
Overseas Donations		Credit: Bank deposits, etc.	Debit: Fund Balances
		Fiscal payments payable/Other income	Credit: Other Budget Revenue
		Debit: Asset Disposal Expense	
		Accumulated Amortization of Public Data Assets	Debit: Other Expenses
Transfer without compensation		Credit: Public Data Assets	Credit: Fund Balance
		Bank Deposits, etc.	
		Debit: Transfer of Net Assets (Non-Compensated)	
		Accumulated Amortization of Public Data Assets	Debit: Other Expenses
Approved write-off		Credit: Public Data Assets	Credit: Fund Balance
		Debit: Asset Disposal Expense	
		Credit: Bank Deposits, etc.	
		Debit: Asset Disposal Expense	
Approved write-off	for	Accumulated Amortization of Public Data Assets	No accounting entries
		Credit: Public Data Assets	

6 CONCLUSION

The development of public data resources is a critical measure to advance the market-oriented allocation of data as a production factor, a strategic initiative to unlock the potential of data assets, and a key pillar supporting the growth of the digital economy. This paper focuses on the accounting recognition and measurement of public data assets held by administrative and institutional units, systematically exploring the challenges arising from the unique characteristics of public data assets and the insufficient adaptability of the current accounting framework. The study clarifies the conceptual distinction between public data and public data assets, and delves into the recognition criteria for public data assets within administrative and institutional units, demonstrating both the feasibility and the particularities of recognizing such assets under existing accounting standards. Regarding measurement, through a comparative analysis of the applicability of inventory, intangible assets, and other relevant accounts under the current Government Accounting Standards – Specific Standards, the paper argues for establishing a dedicated primary account titled “Public Data Assets.” Furthermore, it provides a detailed discussion on accounting treatment for public data assets across subsequent measurement stages, including initial recognition and amortization, subsequent expenditures, impairment assessment, and disposal, outlining practical approaches for each stage in accordance with professional accounting principles.

This article not only enriches the accounting framework for emerging assets within the field of government accounting, providing an accounting-based solution for the standardized management of public data assets, but also offers practical guidance for administrative and institutional units to enhance the efficiency of public data asset management and facilitate the market-oriented circulation of data as an economic resource. Future research could further explore dynamic valuation models for public data assets, as well as detailed accounting approaches that reflect differences across hierarchical levels and types of administrative and institutional units, thereby better accommodating the complexity and diversity inherent in data assets.

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