Public Data Valorization: A Three-Stage Framework and Insights from China

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Abstract: Data is now a core production factor, yet research lacks a coherent account of how public data creates value and how governance supports that process. This study proposes a clear three stage framework for public data valorization that links resourceization, assetization, and capitalization to activities in the data value chain. Built from the literature and examined in the Chinese context, the framework yields three findings. Resourceization focuses on lawful collection, standard processing, and secure usability. Assetization clarifies rights, converts data resources into measurable assets, and enables circulation. Capitalization embeds data in real use cases and combines it with other factors, using market mechanisms to realize and expand value. We also summarize four complementary modes in China, namely sharing, openness, authorized operation, and transaction, and explain their roles and advantages. The study provides stage linked challenges and governance priorities, offering practical guidance for policy design and valorization process refinement.

Keywords: Public data, Open data, Government data, Data value, Value creation.

1. INTRODUCTION

Information technology is advancing rapidly, and globalization and digitalization are converging more deeply. Together, these forces have ushered the world economy into a new era centered on digital technologies. The digital economy has become critical for national competitiveness, productivity growth, and resilience to uncertainty. Data now stands alongside land, labor, capital, and technology as a core production factor. Within this production-factor system, public data has emerged as a foundation for institutional innovation and industrial upgrading. Many countries are accelerating policy frameworks for the development and use of public data. Policies, institutions, and infrastructure are advancing in tandem, creating a strategic window for public data valorization.

At the same time, artificial intelligence, represented by large language models, is iterating rapidly and entering a breakthrough phase. As a major component of big data, public data is broad in coverage, readily accessible, and has a relatively low marginal acquisition cost, and thus provides key data support for AI diffusion across sectors (Sun, 2024). Continued progress in algorithms and computing capacity has simultaneously raised demand for high-quality public data and improved the efficiency and depth with which it can be processed, integrated, and applied.

Under the pull of policy and the push of technology, the value extraction and application of public data across concrete have gained new traction. Public data exhibits multi-dimensional value: on the public value side, it can move beyond one-way e-government supply to improve transparency, foster participation, and enable better community responsiveness (Kassen, 2013); on the economic side, it can strengthen firm competitiveness (Magalhães & Roseira, 2017), stimulate innovation, and support growth (Kučera & Chlapek, 2014). Yet despite policy progress and visible value effects, existing research remains fragmented on the mechanisms and process logic of public data valorization. A system-level analytical framework that organizes policy practice and industrial application, and that clearly characterizes staged features, is still lacking. A gap persists between theory and practice.

This article addresses that gap by taking public data valorization as the organizing thread and, from a value-chain perspective, proposing an explanatory analytical framework comprising resourceization, assetization, and capitalization. We specify the defining features, governance priorities, and logic of value generation at each stage. We then situate the discussion in the Chinese policy and industrial context, delineate the boundary of public data, and systematically examine four implementation pathways for valorization: sharing, openness, authorized operation, and transaction. Building on this, we assess the main challenges in the valorization process and put forward policy and governance recommendations. The aim is to provide operational tools for institutional design and practical implementation, and to offer an analytical basis for subsequent evaluation and international comparison.

In this article, public data valorization refers to the overall process through which public sector data is converted into measurable value. This process unfolds in three stages: resourceization, assetization, and

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Received on 10-10-2025 Accepted on 02-11-2025 Published on 11-11-2025

E-ISSN: 2978-8196/25

capitalization. Resourceization is the upstream conversion, by the public sector, of raw records into structured, legally compliant, high-quality, and interoperable data resources. Assetization entails the legal-institutional recognition and governance of those resources as assets, with defined rights and responsibilities, defined valuation and measurement, lifecycle management, and auditability. Capitalization is the downstream deployment of data assets in administrative, market, and societal contexts to generate public and economic value. Throughout, "valorization" names the umbrella process; "resourceization, assetization, capitalization" are the stages within it.

There are three main contributions. First, it advances a value-chain-oriented, staged framework that explains the evolution of public data from resource to asset to capital. Second, within China's policy and industry setting, it distills four replicable implementation pathways and their governance essentials, thereby building a bridge between theory and practice. Third, it develops policy-focused recommendations from the perspective of challenges and responses, providing a usable analytical reference and implementation route for building the market for the data factor and for trustworthy governance.

2. RELATED WORK

Existing research on public data valorization encompasses three key strands.

2.1. Dimensions and Measurement of Public Data Value

Research on public data value addresses two questions: what constitutes value and how it can be measured.

On the content side, one stream takes a user-centered view that treats value as shaped by citizens' and users' expectations. For example, Men (2021) frames the value of open government data by what stakeholders expect and how they expect to obtain it. In a similar vein, Ma (2022) develops a perceived-value scale for public-data platforms that distinguishes basic, security, service, and respect value.

A second stream adopts a public-value perspective. Callinan *et al*. (2018) link open data and co-creation to public value and propose dimensions such as outcomes, trust, effectiveness, and openness. Building on Benington's taxonomy, Wang (2022) argues that the public value of public data spans ecological, political, administrative, social, cultural, and economic domains. Su (2024) likewise argues that public value creation is central, with measurable effects in social governance. The study also highlights attributes of public data: shareability, openness, and economic relevance.

On the measurement side, studies focus on indicators, methods, and assessment programs. Zheng (2016) reviews existing indicator dimensions and notes prevailing emphases and blind spots. Huang (2017) constructs a multi-level index system for government data across social, economic, political, and technological dimensions.

Methodologically, composite scoring based on indicator systems is often combined with traditional asset-valuation approaches. Pan (2023) applies cost, income, and market methods to design pricing and valuation models for provincial public data, while Fu (2024) proposes an enhanced cost approach that integrates composite scoring and weighting.

In practice, assessment frequently proceeds through professional reports, such as the Open Data Barometer, the European Commission's Open Data Maturity Assessment, and Fudan University's Report on Local Public Data Openness and Use.

2.2. Mechanisms for Public Data Valorization

This strand focuses on how public data generates and transmits value, encompassing both system-level mechanisms and those specific to individual stages.

On the system side, Attard *et al*. (2016) argue that open government data (OGD) value creation requires end-to-end management and multidimensional evaluation. They map OGD workflows and enabling technologies, propose linked data upgrades, and present an 18-dimension assessment framework to enhance conversion efficiency.

Chen (2025) traces data's evolution from natural to economic to property attributes, operationalized through resourceization, assetization, and factor market mechanisms. He also designs complementary mechanisms for resource openness, asset development, and factor market operation.

Chu and Tseng (2018) develop a public value evaluation for e-governance across operational, political, and social dimensions, pair it with a three-step open data screening process, and validate the approach using Taiwan's open data portal. Sun (2025) models a city-level "data–information–knowledge" progression and clarifies governmental roles by stage. Building on open data ecosystem theory, Zou (2025) articulates a "resource–actor–environment" logic for valorization.

On the module side, Zhao (2025) designs a supply and demand matching mechanism for open data platforms, guided by the logic of openness and scenario pull. Focusing on circulation, Zhang (2024) introduces a three-anchored transaction arrangement—a "data value community" in which governments, industry associations, and third-party platforms collaborate to maximize value release. Drawing on a digital governance ecology perspective, Men (2025) models authorized operation as an ecosystem with three interacting networks: authorization management, data operation, and feedback services, delivering dual social and economic value.

2.3. Governance for Public Data Valorization

Research on the governance for public data valorization concentrates on three areas: governance scope, governance challenges, and governance pathways.

Focusing on governance scope, Wang Y. (2023) delineates macro, meso, and micro layers, placing institutions and policy at the macro level, rights and responsibilities at the meso level, and operational and technical norms at the micro level. Also focusing on scope, Wang X. (2024) proposes a multi-layer architecture for public data governance that comprises value, use, data, institutional, and environmental layers.

Focusing on governance challenges, Zuiderwijk and Janssen (2014) develop an open data policy comparative framework covering context, content, performance indicators, and public value; their analysis of seven Dutch agencies reveals varying motives and openness, goal-implementation misalignment, and weak impact evaluation. From a legal perspective, Li (2025) argues that gaps in open government data frameworks hinder effective oversight and raise misuse/leakage risks. From an authorized operation lens, Hu (2024) identifies unclear responsibility allocation, imbalanced risk sharing, and insufficient incentives.

Focusing on governance pathways, Veljković, Bogdanović Dinić, and Stoimenov (2014) introduce the OpenGovB benchmarking model to measure progress in government openness and to guide policy refinement and release strategies. Yuan (2020) outlines a governance route that builds supervisory systems, strengthens behavioral constraints, and establishes safe harbor arrangements. Ouyang (2023) proposes data trusts as an institutional innovation for public data governance and explores designs suited to the Chinese context.

Taken together, the three strands address, in turn, how to identify and measure value, how value is generated and transmitted, and how realization can be safeguarded. What remains under-theorized is the evolutionary process and internal logic of public data valorization.

3. A THREE-STAGE EXPLANATORY ANALYTICAL FRAMEWORK FOR PUBLIC DATA VALORIZATION

Grounded in the synthesis in Section 2, We synthesize and distill recurring mechanisms, governance levers, and value linkages identified in the literature. Meanwhile, we note that as a core component of the data factor, public data follows a valorization pathway comparable to that of general data. From a data form perspective, valorization unfolds through a dynamic progression of resourceization, assetization, and capitalization, which correspond to three forms of data: data resources, data assets, and data capital (Du, 2020). From a value-chain perspective, the valorization of the data factor can be parsed into four basic activities: data collection, data organization, data circulation, and data application (Ma, 2023). Accordingly, we develop a conceptual framework for public data valorization. We delineate the stages of valorization by data form and link each stage to specific activities in the value chain, thereby revealing the dynamic process of public data valorization.

More specifically, resourceization entails collecting and organizing data to convert raw, fragmented and unordered records into standardized, well-structured datasets fit for use. Assetization is central to valorization, turning data resources into measurable economic assets, clarifying ownership and benefit sharing through a clear rights regime, and enabling lawful data circulation. Capitalization leverages data use to run data assets on a market basis, scaling value creation and pushing the frontier outward. Figure **1** shows the framework structure. We next examine the key steps, defining features, and governance priorities of public data valorization stage by stage through this framework.

3.1. Public Data Resourceization

Resourceization is the starting point of public data valorization and maps mainly to the value chain activities of data collection and data organization. Through standardized collection and organization, raw records are turned into datasets with development potential. This completes the transformation from raw data to data resources, laying a solid supply foundation for subsequent assetization and capitalization.

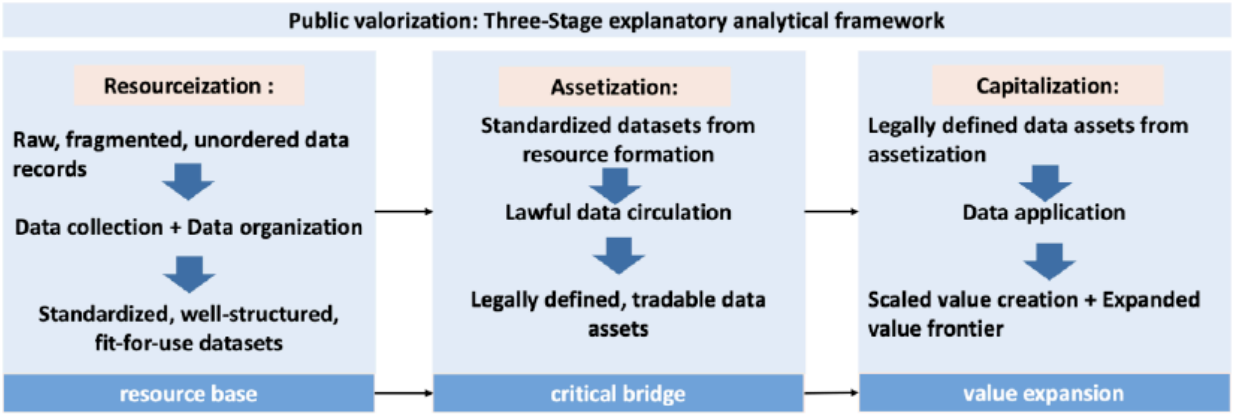

Figure 1: the three-stage explanatory analytical framework.

During data collection, actors can be grouped by the direction of data flow into submitters and holders or managers. Submitters include enterprises, individuals, and social organizations that lawfully report information in routine production and daily life. Holders or managers are the entities that store and administer public data, mainly government departments, data management agencies, and public utilities. In performing public functions or providing services, they collect, retain, and manage public data in accordance with law.

During data organization, holders or managers lead organization. A common pipeline includes classification and aggregation, cleaning and transformation, and de-identification. The output is standardized and unified datasets. Building on this pipeline, light algorithmic processing can generate descriptive information about the data (Huang, 2022).

The resourceization stage of public data has three salient features. First, multi-actor collaboration: reporting, receipt, and processing involve coordinated roles for government agencies, enterprises, citizens, and social organizations, each discharging legal duties in initial collection and organization. Second, standards-based management: interdepartmental and cross-platform movement of public data requires unified specifications embedded in collection and organization. Third, security sensitivity: as circulation broadens and AI use grows, privacy and security gain salience; because public data is collected under public authority and enjoys high social trust, data holders and managers must balance development and use with privacy protection more carefully than for corporate or personal data.

Accordingly, indicators can be designed to evaluate the achievement of public data resourceization, encompassing data quality, integration extent, and supply efficiency. Specifically, data quality is measured by the field missing rate, consistency by cross-departmental data conflict frequency, integration extent by the conversion rate of raw data to standardized datasets, and supply efficiency by the data collection cycle.

And the governance of resourceization should focus on three priorities. Legality and compliance come first. Collection should respect informed consent and privacy laws, and the legal relationship between recipients and submitters should be clarified to protect submitters' rights (Bao, 2025). Unified standards for collection and organization are the second priority. A robust classification and grading regime and consistent specifications for like-for-like data raise accuracy and consistency, improve conversion from data to data resources, and support orderly cross-department and cross-platform movement. Security management and privacy protection are the third pillar. Encryption, access control, and anonymization should be applied across storage, transmission, and use, complemented by oversight arrangements that ensure resourceization proceeds safely and remains auditable.

3.2. Public Data Assetization

Assetization is the critical bridge of valorization and is closely tied to data circulation. It means that, under specified conditions, data resources are transformed into definable, operable, and measurable data assets or data products. Liu (2025) argues that circulation and assetization are mutually reinforcing, and that market mechanisms help maximize data value. During circulation, datasets with potential value are converted into priced economic resources. The transition of data from a natural to an economic attribute brings its value into realization.

Circulation can be grouped by participant configuration into internal and external flows. For public data, internal circulation refers to sharing within the

producing organization or across public bodies, for example interregional sharing among government departments. External circulation refers to exchanges between public bodies and enterprises, citizens, or social organizations, typically through openness or transaction. The two types differ in emphasis. Internal circulation primarily expresses public management value. External circulation, on the basis of public use value, releases more economic value. The effectiveness of public data assetization is evaluated through metrics including the asset confirmation rate and public data asset transaction volume. The asset confirmation rate is calculated by counting legally confirmed registered public data assets.

The assetization stage of public data has two salient features.

Feature 1: reliance on circulation foundations. Assetization rests on three foundations: data infrastructure, a rights framework, and a rule set for circulation and transaction.

Firstly, robust infrastructure is the basic foundation. Public data is stored, shared, openly utilized, and traded through platforms. Secondly, a clear rights framework is a necessary precondition. The key distinction between assets and resources is explicit ownership and measurable value. Building on the path from resource to asset, a clear rights framework should specify holding, processing and use, and product operation. Holding rights clarify the custodian of the resource; processing and usage rights facilitate lawful development; product operation rights empower market entities to convert assets into marketable goods or services. Clear entitlements allow valuation and measurement to proceed on a defined basis. Thirdly, A coherent rule set for circulation and transaction is essential for safety and control. Rules should cover valuation, transaction procedures, benefit sharing, and safeguards. Without such rules, assetization is difficult to realize in practice.

Feature 2: complementarities among multiple pathways. In practice, pathways for assetization are diverse and their value effects differ. For example, data released for free open use generally has lower quality than traded data and affords less depth for value extraction. The choice of pathway, or a combination of pathways, should match the characteristics and value potential of the resource so that coordinated use of multiple routes maximizes value while keeping costs and risks under control.

Accordingly, the governance of assetization should focus on three points. Firstly, clarify rights and responsibilities in circulation. Observe the boundaries of the rights framework by clarifying the rights and responsibilities of all actors and by assigning accountability that is traceable. Secondly, standardize circulation rules and procedures. It covers two key sets of rules. One of them is authorization rules, which standardize authorization workflows, contract templates, usage boundaries, as well as disclosure and withdrawal mechanisms. The other one is measurement and pricing rules, which unify the measurement standards, pricing mechanisms, and auditing systems for data assets, laying a solid institutional foundation for assetization. Thirdly, ensure alignment between pathways and objectives. Match the assetization pathway to the characteristics of the data and to the targeted benefits in order to maximize effectiveness.

3.3. Public Data Capitalization

Capitalization is the terminal stage of valorization and focuses on data application for value expansion. After assetization converts data resources into products, value begins to be released. Capitalization scales that value through market-oriented deployment. In practice it proceeds mainly via integration along two pathways: scenario integration and factor integration.

In terms of the scenario integration pathway, public data is embedded in concrete sectors such as finance, transport, and health. In finance, institutions verify firm registry information and credit ratings to assess risk and to improve underwriting and monitoring. In transport, the Ministry of Transport launched an industry open data platform in 2016 that offers experimental datasets, analytical tools, and models to the public, which fostered managerial innovation in the sector (Wang, 2018). In healthcare, the Shenzhen Data Exchange analyzed datasets from the Futian District Health Bureau and district hospitals to create a fast-track channel for commercial insurance claims, serving about 3 million patients and reducing insurers' claims costs by roughly 50 percent. These cases show that scenario integration can raise the market value of public data assets.

In terms of the factor integration pathway, public data combines with traditional factors to generate multiplier effects. Coupled with AI and large-scale analytics, it can deepen value release. Used as training or grounding material for large language models, public data can improve public resource allocation, support innovation in governance practices, and advance the digital transformation of public administration, thereby informing government decision-making (Men, 2024).

For public data capitalization, its effectiveness can be verified by estimating the market value scale of data

assets and the value amplification effect of public data in specific scenarios. For instance, the improved efficiency of credit approval by financial institutions using credit data, or the pollution reduction rate achieved by applying ecological public data to environmental protection initiatives.

The value generated through public data capitalization is shaped by two key factors and closely tied to its governance priorities. First, operator capability matters. The value of data is context dependent, so operators need strong development and commercialization skills, close alignment with demand, and the ability to identify high-yield paths for value creation. Second, market conditions matter. Efficient movement of capital in data form requires a transparent and stable data-factor market. Improving market institutions, clarifying rules, and building credible venues for exchange are essential to sustain capitalization.

4. THE INSTITUTIONAL PRACTICE OF PUBLIC DATA VALORIZATION IN CHINA

China currently pursues public data valorization through four approaches: sharing, openness, authorized operation, and transaction. Figure **2** compares their core characteristics. We introduce each in turn below.

4.1. Delineating the Boundary of Public Data

There is no unified consensus in China on what constitutes public data. Clarifying the concept is a prerequisite for valorization, since it determines the upstream scope of supply and thus conditions all downstream stages.

At the national level, policy documents have not provided a single, explicit definition. Policy issued in 2024 characterizes public data as data generated when public authorities and public-service entities perform their functions, identifying the producing bodies, the producing acts, and the attribute of the data as a foundational strategic resource. Measures adopted in 2025 further describe holders of public data resources as including central Party organs, Party committees at and above the county level, and public utilities such as water, gas, heat, power, and public transport providers.

At the local level, some jurisdictions have codified their own definitions. For example, the Zhejiang Provincial Regulation defines public data as data collected or produced by state organs, legally authorized organizations with public-affairs mandates, and public-service operators such as water and power utilities in the course of performing their duties or providing public services. Taken together, these texts indicate a policy logic that centers on actors and actions, which offers a workable basis for an identification framework.

Although consensus is absent, definitions in policy rules generally combine subject elements and behavioral elements. Much of the Chinese scholarship follows this element-based approach. Wang (2023) argues that public-data identification should satisfy the public nature of both the subject and the behavior, and

Valorization models	Features	Advantages	Limitations
Sharing	• Internal circulation within public sector • Rapid data reuse & redundant collection reduction • Alignment with resourceization	• Improves administrative efficiency • Lowers collection costs • Boosts data resource integration/activation	• Lacks market-oriented value realization • Restricted to internal public-sector scope
Openness	• Public good-oriented external circulation • Universal access & low access threshold • Bridge between resourceization and assetization	• Ensures equal access opportunities • Lowers social data access costs • Accumulates usage contexts & feedback	• Dominated by low-tier, low-value data • Inadequate for deep value extraction • Dependent on complementary pathways
Authorized operation	• Assetization-oriented authorized development • High-value & sensitive data focus • "Raw data in-domain, usable but invisible" principle	• Unlocks high-value data valorization • Enables data pricing & measurement • Balances value release with risk control	• Incomplete property-rights definition • Unclear responsibility transition • Dependent on mature regulatory systems
Transaction	• Market-oriented value circulation • Two forms: Exchange-Traded & Over-the-Counter	• Unlocks substantial valorization potential • Enables standardized/ flexible transaction options • Bridges authorized operation products to market	• Lack of unified circulation rules • High transaction & compliance costs • Inadequate transparency & supervision (OTC)

Figure 2: Valorization Model Comparison.

that publicness is not determined by data content alone but by the producing subject, the act, and the context. Zheng (2021) decomposes the definition into subject, purpose, and behavior, treating publicness as the core and using the involvement of public interest as the criterion. Building on the subject plus behavior standard, Huang (2021) proposes that holders are public institutions financed wholly or partly by public funds. Shen (2023) maintains a dual criterion that both the source subject and the data content must represent public interest.

In contrast, Song (2024) characterizes the above as a normative paradigm and points to a problem of "secondary identification" in the opening process. He advocates identifying public data as data suitable for the open regime and available for social development and use, which means it must carry public-use value. Similarly, Wang (2022), drawing on comparative policy, argues that data held by public bodies but not released into the public domain should not be considered public data. Hu (2019) treats data in the public domain that involves public interest as public data even if it was not generated by government.

These debates can be organized into two paradigms. The first, normative, emphasizes element properties. It starts from policy-relevant subjects and behaviors and examines how publicness is expressed within those elements, using that publicness as the criterion. This paradigm aligns well with the existing policy system, although contestation over the scope of publicness makes boundaries fuzzy in practice.

The second, functionalist, emphasizes use. It begins with the purpose of open use and excludes data that does not directly possess public-use value. This approach helpfully incorporates identification purpose, stresses demand and scenario orientation, and is conducive to applications. Under current Chinese policy and administrative practice, however, public data is managed in tiers to control risk, and higher-tier data is often restricted or not opened at all. A strictly functionalist approach may therefore sit outside the current institutional framework and have limited practical traction. For instance, the Yantai guideline classifies public data as unconditionally open, conditionally open, or not open. Overreliance on use criteria also risks scope expansion and rising governance costs, which is not helpful for a stable order of valorization.

Synthesizing the two and remaining feasible within the existing framework, this paper proposes an integrated definition: public data refers to data that is generated, collected, or controlled by state organs, organizations legally authorized to manage public affairs, and public-service operators in the course of performing public-management duties or providing public services. Such data inherently carries public management value; a subset may, under specified conditions, acquire public-use value.

On the supply side, this retains the normative paradigm's subject and behavior elements and the basic publicness of origin. On the demand side, it incorporates the functionalist emphasis on use value and points directly to the goal of valorization. By mutually constraining publicness criteria and use criteria, the definition clarifies attributes and boundaries, avoids overextension of the notion of publicness and of the data scope, and better aligns with valorization.

Under this definition, public data exhibits four characteristics: publicness, multi-actor provenance, graded value, and normativity. Publicness lies in production by public-function subjects that generate, collect, or control the data. Multi-actor provenance reflects the plurality of producing bodies. Graded value means that public management value is inherent, while public-use value arises only when specified conditions are met within a tiered management system. Normativity indicates that public data is produced according to law and is subject to legal rules and oversight.

4.2. Implementation Pathways for Public Data Valorization

4.2.1. Sharing

Sharing mainly promotes the internal circulation and rapid reuse of public data within the public sector system, reduces redundant collection, and accomplishes the integration and activation of data resources. It is primarily associated with the process of public data resourceization, laying the foundation for assetization by improving the efficiency of data resourceization. Figure **3** shows the sharing model.

Current policy in China calls for coordinated sharing of government-held data, stronger support from existing platforms, and cross-level, cross-region, cross-system, cross-department, and cross-business data sharing and workflow coordination. In other words, sharing first serves internal management and coordination. Its immediate goals are to improve administrative efficiency and public service performance and to reduce duplicated collection and organization by reusing data that already exist. For example, Hainan Province established a catalog-based coordination mechanism and, using an integrated provincial big-data platform, achieved efficient sharing of public data across the province; platform-based internal sharing not only makes public management

value visible, it also helps generate reusable lists of data products (Jin, 2025).

Because sharing involves multiple actors and cross-platform flows, two issues deserve priority attention: compliance and feasibility. First, internal circulation must rest on applicable laws, regulations, and internal rules, with safeguards against leakage of sensitive or classified information. Compliant sharing also creates an evidentiary basis for clarifying rights and permitted uses at the assetization stage. Second, for public data to move, quality and platform capacity matter. Improving the quality of supplied resources and upgrading platform infrastructure are necessary to remove internal bottlenecks and make sharing practicable. The smoothness of sharing directly affects whether resources can be converted into operable data products and influences the choice and cost of subsequent external circulation pathways.

4.2.2. Openness

Openness is often treated as the starting point for external circulation. Openness serves two functions: on the supply side it releases already processed datasets as a as a public-good-style provision, bridging the transition from resourceization to assetization; on the demand side it accumulates usage contexts and feedback through socialized use, creating conditions for deeper value transformation. Figure **4** shows the openness model.

As Meng (2024) notes, openness is a means of universal access that aims to ensure equal opportunities for the public and market actors. The main participants include public data management authorities, opening entities that supply datasets on behalf of public bodies, and users that constitute the demand side, including natural persons, legal persons, and unincorporated organizations who lawfully obtain datasets that are fully open or conditionally open. Supervisory bodies, such as data management agencies, provide coordination, guidance, and oversight. The open data platform is the bridge between supply and demand and the principal carrier of public data resources.

In China, the open-use process typically involves dataset consolidation, consistency review, centralized management, and public release. In practice, opening entities create work orders against the open catalog, consolidate processed datasets to the platform, and keep them updated. Management authorities then conduct consistency checks to verify alignment between the catalog and the consolidated datasets. Once approved, the opening entity manages datasets and APIs. For dataset management, it configures the mode of opening, categorization, licensing, and de-identification. For API management, it sets parameters and publishes APIs to the platform. Supervisory authorities then release datasets and interfaces using publication modes that match the openness attributes. This workflow strengthens internal governance and adherence to standards at one end, while lowering social access costs at the other, so that openness is both controlled and usable, converting public management value into a public-use value that is visible to users.

China's open data platform development began in 2012 with municipal platforms in Beijing and Shanghai. As of July 2024, 243 cities had launched local open-data portals, indicating steady expansion. For example, the Beijing Municipal Open Data Platform listed 4,046 catalog entries organized by theme, source department, and region, and provided two primary access modes, namely file download and API calls.

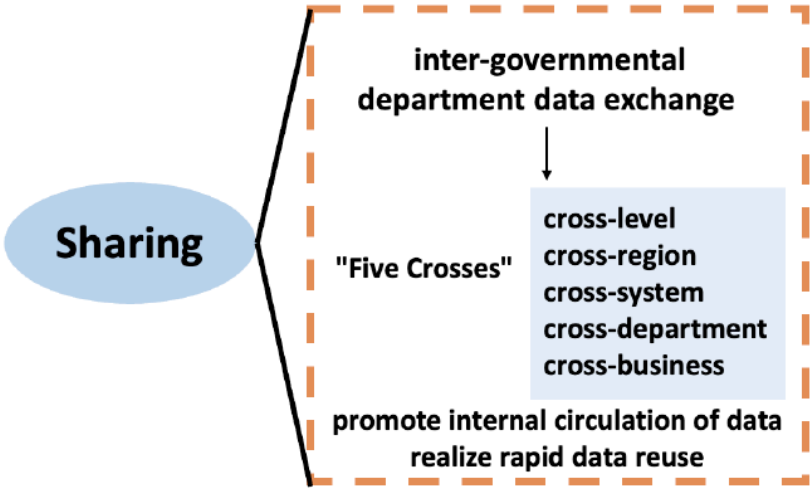

Figure 3: Valorization model: Sharing.

The platform also introduced common tools and interactive feedback to survey demand, reinforcing a virtuous cycle between use and supply. Empirical work further notes that current platforms operate through models such as public–private collaboration, open-data competitions, and regional applications (Feng, 2025).

The openness model is designed to provide a convenient channel for the socialized development and use of public data, supporting analytical work and related industries. Its user base includes firms, research institutions, and the general public, and compared with other external circulation pathways it is more universal and public-interest oriented. In terms of data tiers, however, platform content tends to be lower tier, and many higher-tier, higher-value resources cannot be valorized through openness alone. This inherent limitation constrains deeper value extraction.

In the division of labor across pathways, openness is therefore best suited to broad coverage and low access thresholds as a foundational supply. Demands that require deep mining and strong transformation need complementarity with authorized operation and transaction. Put differently, openness provides the sustainable supply base and demand signals for public data valorization, but it has inherent limits, and subsequent value conversion depends on coordinated use of the other pathways.

4.2.3. Authorized Operation

In 2025, China's policy framework for developing and using public data coalesced into a "1+3" system that specifies the definition, actors, and basic procedures for authorized operation. Authorized operation refers to the governed activity whereby public data held by people's governments at or above the county level and by national industry regulators is, in accordance with law and relevant rules, entrusted to qualified operating institutions for governance and development, which then supply data products and technical services to the market on a fair basis.

Authorized operation is primarily associated with assetization activities, and promoting it is of great significance for the implementation of data pricing, measurement, and other related practices. Its role is to transform high-value public data that is not suitable for direct open release into operable and measurable products and services, releasing value while adhering to the principle that raw data stays within the domain and remains available but not directly visible. Figure **5** shows the authorized operation model.

The main participants are the authorizing body, the authorized operator, the implementing agency, and the regulator. The authorizing body is typically the holder or manager of the public data resource, including governments at or above the county level, national industry regulators, Party organs, and public utilities. The authorized operator is a legal entity that, having obtained authorization according to law, develops and operates within the authorized scope. The implementing agency is designated by the authorizing body to carry out the operational tasks in line with the chosen authorization mode. The regulator is generally the data management authority, such as the national or provincial data agency or the data units within line ministries. In terms of role, the authorizing body and the operator form the core; the implementing agency acts as an intermediary tool, assisting with the implementation plan, pre-qualification, and selection; the regulator provides coordination, guidance, supervision, and feedback.

The procedure comprises an implementation plan, operator selection, agreement and filing, operation and management, and supervision with adjustment. The data management authority leads the implementation plan, setting the authorization mode, scope, term, benefit-sharing mechanism, and selection criteria, and it submits the plan to the required collective decision-making process. The data-producing body, as authorizer, entrusts the implementing agency to select the operator and conclude the operating agreement in accordance with the plan; the implementing agency tracks execution dynamically. The operator develops

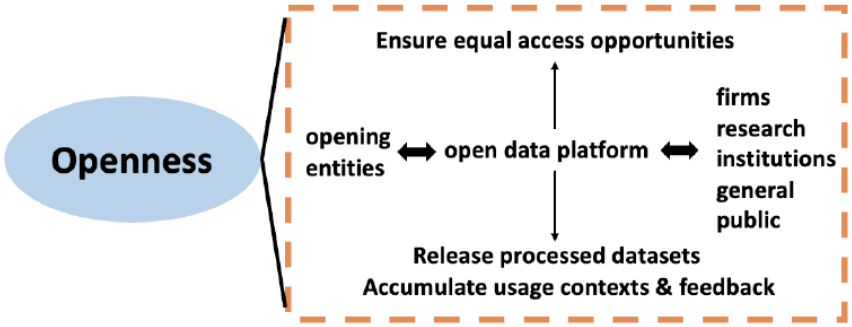

Figure 4: Valorization model: Openness.

and governs the datasets within scope, produces data products and services, completes registration under the public data resource registry, discloses operating information on a periodic basis, and accepts supervision by the data authority.

Prior to the consolidation of the "1+3" framework, practice featured direct, indirect, and hybrid authorization paths, differing in whether third parties beyond the authorizer and the operator were involved (Zhong, 2025). The policy introduction of the implementing agency and its defined responsibilities has since standardized the operational chain. The implementation plan is the foundation for safe and controllable authorized operation and should be guided by resource characteristics and scenario needs. For example, scope can be defined as holistic, domain-specific, or scenario-specific. Because the operator's governance capability will shape value outcomes, qualification review and selection methods should be specified rigorously in the plan.

Compared with datasets on open platforms, resources suitable for authorized operation are typically higher in potential value and higher in sensitivity. Authorized operation provides a path for conditional opening: producers convert data that cannot be released directly into products and services, thereby allowing more high-quality resources to circulate while observing the principle that raw data does not leave the domain. As operators and downstream commercial entities participate more deeply, issues of rights transfer and allocation of responsibilities arise.

Policy therefore advances a three-part rights framework for public data, namely holding, processing and use, and product operation, which provides the institutional basis for transferring and aligning rights across stages. Examples include whether the authorizer grants both processing and product-operation rights to the operator and whether reauthorization is permitted and under what conditions. Clear property-rights arrangements are a precondition for forming stable data assets and for moving toward capitalization.

However, property-rights determination and protection remain incomplete. On entitlement, the content and boundaries of each right require clearer statutory articulation. On authorization, the transition of responsibilities among participants along the operational chain is not always explicit. Current rules emphasize that operators may not directly or indirectly participate in the redevelopment of delivered products and services within scope, yet boundaries for redevelopment, disclosure obligations, and asset auditing mechanisms still need refinement. To unlock value more fully, the property-rights framework for public data should be further specified and operationalized.

4.2.4. Transaction

Transaction is one of the important approaches to the valorization of public data. And the products and services generated by authorized operation can also circulate via market transactions. Within the valorization chain, transaction performs a core market function and is a key mechanism for capitalization. According to reports by the Shanghai Data Exchange, China's data trading market is projected to grow from roughly RMB 153.7 billion in 2023 to RMB 715.9 billion by 2030. With public data accounting for about 80 percent of total social data, the potential for public-data transaction is considerable.

In China, transaction takes two main forms: Exchange-Traded and Over-the-Counter. Exchange-Traded relies on exchanges and platforms

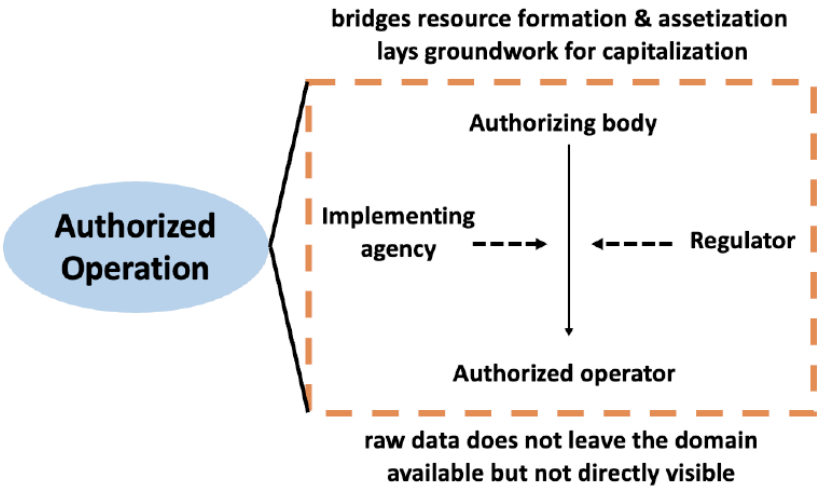

Figure 5: Valorization model: Authorized operation.

that provide entitlement registration, asset pricing, matchmaking, and settlement services. Participants include data suppliers, data users, transaction platforms, data service providers, and regulators; platforms intermediate between buyers and sellers, while service providers include data developers and third-party firms offering evaluation and consulting. Over-the-Counter refers to non-standardized, direct transactions between public data producers and market actors. Exchange-Traded favors standardization, transparency, and auditability, whereas Over-the-Counter offers flexibility and fast response for customized, small-scope needs, but it is weaker in transparency, orderliness, and oversight, which can hinder stable progress in valorization. Figure **6** shows the transaction model.

At present, most transactions involving public data occur between government and enterprises and are Over-the-Counter. Although flexible, off-venue deals often lack transparency and consistent order, and they are harder to supervise, which makes security and compliance difficult to guarantee and complicates the formation of replicable valorization pathways. By contrast, Exchange-Traded can mitigate information asymmetries, but high negotiation and compliance costs deter many firms, so scale and efficiency lag behind off-venue deals.

Moreover, even though more than 20 provinces have promoted data exchanges, with a national total of about 58 exchanges, public-data transaction still lacks unified circulation rules, including pricing models, property-rights definitions, and benefit-sharing standards, which introduces regulatory risk. Zhang (2025) argues that firms face barriers to on-venue participation because data suppliers lack incentives and the capability to bring assets to market, and because gaps in data service providers reduce the platform's attractiveness.

These issues mean that transaction has high potential but also faces significant frictions. To enable circulation through transaction, China needs more complete transaction rules and a trustworthy market ecosystem, along with calibrated regulation of dispersed Over-the-Counter and sustained nurturing of Exchange-Traded. Yuan (2024) notes a parallel and linked relationship between authorized operation and Exchange-Traded. Compared with Exchange-Traded, authorized operation typically entails lower transaction costs and plays the primary, direct role in circulating public data resources, while Exchange-Traded serves indirect and complementary functions.

In short, the role of transaction in circulation is conditional and complementary. Its boundary depends on the maturity of assetization and the completeness of rule supply. Only in coordination with authorized operation and openness can transaction reliably support the step toward capitalization.

5. CHALLENGES IN PUBLIC DATA VALORIZATION

5.1. Challenges in the PUBLIC Data Resourceization

Although the stock of public data is vast, the effective supply remains below potential. The resource formation stage addresses whether public data can be supplied at scale and with adequate quality. In data collection, ambiguous conceptual boundaries and security concerns depress the willingness to supply. In data organization, low conversion efficiency yields resources that are uneven and difficult to use.

5.1.1. Data Collection: the Constraint of Ambiguous Public Data Definition

There is no unified definition of public data. Conceptual ambiguity prevents custodians from accurately identifying what falls within the public-data domain, which constrains supply and complicates entitlement and circulation rules. Because public data is the raw form of the factor, an ill-defined scope introduces upstream uncertainty that propagates along the value chain and constrains later assetization and capitalization.

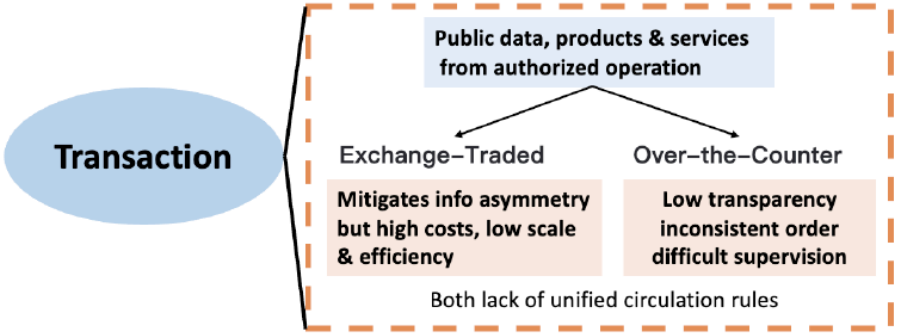

Figure 6: Valorization model: Transaction.

In practice, ambiguity narrows supply: some custodians reduce release to avoid misclassification risk, and valuable datasets remain outside catalogs for lack of clear inclusion criteria. Governance efficiency also suffers, since classification and integration are harder, policy design and enforcement lag, and interdepartmental sharing becomes more complex.

5.1.2. Data Collection: Security Risks Depress the Supply Incentive

On the government side, the framework to balance openness and privacy is incomplete, and the respective rights and duties of data reporters and recipients are not always clear. Security controls are uneven, raising the risk of leakage and misuse. On the market side, users may prioritize commercial value over privacy obligations, and weak oversight during commercialization can undermine public interest and trust.

Faced with potential breaches, misuse, or penalties, and without clearly defined safety boundaries, public custodians adopt defensive postures. This uncertainty directly dampens the motivation to open or share data.

5.1.3. Data Organization: Low Efficiency in Converting Data into Usable Resources

Two issues dominate. First, standardization and quality control are insufficient. Public data is heterogeneous in source, format, and structure; cleaning and format transformation remain demanding, so processing efficiency is low and quality is uneven. Incentives are weak for complete and accurate reporting. Second, data silos make integration difficult. Jurisdictional boundaries and distributed interests create barriers; fragmented management, incomplete classification and grading, and non-integrated platforms lead to dispersed resources and lagging updates. These frictions impede effective sharing and reduce conversion from raw data to usable resources.

5.2. Challenges in the Public Data Assetization

Assetization addresses whether public data can actually move. It is about creating the conditions for smooth circulation so that social and economic value can be released.

5.2.1. Circulation Foundation: Underdeveloped Public Data Infrastructure

Platforms that support high-efficiency access and deeper, value-adding use remain insufficient (Yang, 2023). Infrastructure is the core enabler. Weak storage and management platforms and the absence of standardized exchange mechanisms make interdepartmental sharing difficult and slow. For external circulation, platform-based and standardized processes remain nascent and fragmented across regions. The lack of unified, integrated open-use platforms limits cross-regional access. Open-data portals, data exchanges, and transaction venues are uneven in coverage, and matching between supply and demand remains limited.

5.2.2. Circulation Foundation: an Insufficiently Specified Rights Framework

As the value form of data evolves, assetization involves many actors and complex transfers of rights. Rights allocation should be guided by development, use, and value creation (Peng, 2024). Vague boundaries impede value realization. Governments and public bodies usually hold the resources, yet sources span multiple levels and organizations, which makes the holding right hard to determine, especially when mandates overlap or sharing is required. In the circulation, rights to process and use and rights to operate products must be clear. In authorized-operation settings, unclear responsibilities among the authorizing body, the operator, and downstream commercial entities can lead to overuse or unauthorized secondary processing and to disputes over copyright and revenue.

5.2.3. Circulation Foundation: Incomplete Rules for Circulation and Transaction

A coherent rule set is a precondition for safe, fair, and orderly market-based circulation. Current systems often lack unified mechanisms for pricing, valuation, and benefit sharing of public data assets. These gaps reduce circulation efficiency and market potential and increase security and compliance risks for transactions that involve public data.

5.3. Challenges in the Public Data Capitalization

Capitalization concerns effective data application, embedding public data in concrete demand scenarios so that value is realized and expanded. Two challenges are most salient.

5.3.1. Data Application: Legal and Compliance Risks

As public data enters markets and new use cases proliferate, compliance review becomes more complex. Capitalization can trigger disputes over rights in secondary use and derivative products, raise security risks, and complicate benefit sharing. Without robust ex ante assessment and ongoing supervision, downstream re-use may drift from the original legal basis or permitted purposes, increasing exposure to breach and liability. The core challenge is to keep public data lawful, secure, and sustainable across productization, deployment, and re-use.

5.3.2. Data Application: An Underdeveloped Market for the Public Data Factor

A functioning factor market is a precondition for capitalization, yet market institutions remain thin. Unified mechanisms for pricing, valuation, and transactions are still emerging, which makes assets hard to price and slows the formation and circulation of data capital. On the application side, capitalization is demand driven, but matching mechanisms are weak. Demand faces information asymmetries and cannot articulate precise data needs. Supply often lacks capability to discover granular scenarios and defaults to standardized, general-purpose products. The result is shallow integration with real-world use cases and a structural mismatch between products and needs.

6. RECOMMENDATIONS FOR ADVANCING PUBLIC DATA VALORIZATION

6.1. Establish a Standardized Identification Framework

To unlock scale in resourceization, “public data” should first be defined in law and embedded in a unified classification and grading regime. As Ma (2024) notes, consistent classification not only clarifies governance requirements but also draws workable boundaries between protection and disclosure, which supports valorization.

The national legislature and the State Council can provide statutory definitions and administrative rules; a national data authority and the cyberspace authority can translate them into implementing catalogs and guidance; the standardization administration can issue national standards for terminology, classification, grading, metadata, and catalogs; sector regulators and provincial or municipal data bureaus can carry out domain implementation.

The policy instruments should include a published identification pathway that specifies attributes and intended uses, model checklists agencies can apply at intake, and a standing supervisory mechanism that reviews and updates rules as technology and societal needs evolve. Progress should be tracked through catalog coverage, the share of datasets that are fully classified and graded, and the percentage with a named owner and steward, with a view to reducing scope disputes and retractions.

6.2. Optimize the Supply of Public Data Along Multiple Dimensions

First, the national data authority, cyberspace authority, the justice ministry, and sector regulators should strengthen the legal and regulatory architecture that balances openness with privacy. This includes privacy and security requirements across collection, storage, and use, routine data protection impact assessment for high-risk datasets, designated data protection officers in key agencies, and credible penalties and remedies for misuse. Results can be measured by the share of high-risk datasets with assessments, lower incident rates, faster remediation, and higher compliance with consent or notice requirements.

Second, governments should raise data quality through technology and standards. The national data authority and the standardization administration, supported by fiscal tools from the finance ministry and by government information centers, can promulgate formats, APIs, and semantic standards; provide reference implementations and software kits; and fund cleaning, transformation, and platform tooling. Quality dashboards and incentive mechanisms that reward high-quality reporters can create a positive feedback loop. Target outcomes include higher schema conformance and metadata completeness, greater duplicate reduction and unique-entity match rates, shorter onboarding cycles, and a larger share of API-ready datasets.

Third, cross-agency coordination should break silos and enable secure movement. The national data authority together with sector ministries and provincial data bureaus can conclude inter-agency data-sharing agreements, stand up secure exchange hubs or national open data platforms, and provide secure enclaves or federated approaches for sensitive use. Success should be reflected in higher cross-department access success rates, greater cross-regional dataset availability, more inter-agency use cases, and shorter latency from request to delivery.

6.3. Refine the Rights Framework for Public Data

Legislation should clarify the rights and responsibilities of core actors at each stage of valorization. On entitlement, statutory provisions ought to define the rights and duties of data users; on authorization, procedural rules should be tightened, including model authorization agreements, standardized workflows, and explicit accountability for operating entities, to reduce disputes arising from unclear ownership. At the same time, technology can enable governance. Tools such as blockchains and smart contracts can record each step of data flow, enforce granular permissions, and provide tamper-evident audit trails; smart contracts can automatically execute authorization clauses and balance interests during use (Chen, 2019).

6.4. Build a "Hardware-Backed, Software-Driven" Market for Public Data

On the infrastructure side, accelerate the build-out of open-data and data-transaction platforms. Unified platforms should improve processing, storage, and retrieval capacity; adopt standardized formats, interfaces, and protocols; and ensure secure, convenient interconnection across departments, sectors, and regions.

Strengthen Exchange-Traded by lowering technical and compliance costs and by enhancing the broader digital infrastructure, including networks, data centers, and cloud services to support high-throughput transmission. In parallel, codify transaction rules: introduce pricing and valuation mechanisms, clarify benefit-sharing in the valorization process, and require disclosure and audit to enhance market credibility.

The national data authority, the market-regulation authority, and the finance ministry should issue pricing and valuation guidelines, specify benefit-sharing rules across actors, require disclosure and audit for transactions, and maintain a registry of priced assets with valuation reports.

On the demand side, create effective feedback mechanisms and explore intelligent matching so that public data supply can be aligned with concrete use cases. AI and advanced analytics can power matching services that learn from historical transactions and user behavior to forecast needs and reduce mismatch risk, thereby improving circulation efficiency and maximizing the utility of public data resources.

CONCLUSION

Data has emerged as a pivotal production factor, and both its value-creation process and the governance that enables it have attracted growing scholarly and policy attention. Public data, with its public-good characteristics, differs from corporate and personal data in ownership and governance logic. It therefore requires a distinctive theorization of valorization to fully realize its social and economic benefits.

Taking public data valorization as the core thread, this study first establishes a theoretical foundation through a literature review and identifies a key research gap: existing studies have not yet developed a coherent, system-level theory of valorization. Building on this, the study proposes an explanatory analytical framework based on the evolution of data forms, encompassing three stages—resourceization, assetization, and capitalization. Within this framework, we elaborate on the valorization pathways of each stage by integrating data value chain activities. The research finds that resourceization focuses on compliant collection, standardized processing, and secure usability; assetization emphasizes clear rights definition and measurable value; and capitalization integrates application scenarios with traditional production factors, relying on market mechanisms to externalize and amplify value.

After establishing the theoretical framework, this study further examines the development of public data valorization in Chinese practice. It reconsiders the boundary issue of public data, summarizes the four main valorization modes in China, and analyzes the roles and characteristics of each mode within the theoretical framework. We advance an identification approach that combines supply-side normativity with demand-side purpose: public data carries an inherent public-management value and, under specified conditions, gives rise to a derived public-use value. The four modes operate in a complementary sequence: sharing enables internal reuse and administrative coordination; openness provides broad, low-barrier supply and demand discovery; authorized operation conditionally opens high-value data within graded controls and drives productization; and transaction mechanisms perform price discovery and allocation, working in tandem with the other modes. Then we map the differentiated challenges across stages and outline corresponding responses.

Theoretical significance. This study systematizes public data valorization by clarifying the overall process, setting out its three-stage progression that includes resourceization, assetization, and capitalization, and specifying each stage's core characteristics, governance priorities, and mechanisms of value creation. On this basis it proposes a coherent three stage explanatory framework that advances the theory of public data valorization.

Practical implications. Grounded in the Chinese context, the study sharpens the definitional boundary of public data and maps the operational modes of the field, offering actionable guidance for building standardized systems internationally. It also identifies stage specific challenges across resourceization, assetization, and capitalization and sets out targeted policy responses to support deeper and more scalable implementation.

Limitations. The framework is conceptual and inductively derived from prior literature, and it does not provide causal identification or a comprehensive empirical test. Empirically, we focus on China, which may limit the external validity of our findings in other legal and market contexts. The proposed indicators for assessing outcomes across the three stages are

provisional and need further validation using administrative and market data.

Future work should build stage-connected indicator systems and validate them with long-term and cross-region data, conduct industry-specific studies that measure the pathways from resourceization to assetization to capitalization using similar-experimental or natural-experiment designs, and compare governance and market design across countries to evaluate the applicability and practical limits of the four modes. These directions would move the field from conceptual integration to gradual, evidence-based evaluation.

REFERENCE

Attard, J., Orlandi, F., & Auer, S. (2016). Data driven governments: Creating value through open government data. In Transactions on Large-Scale Data-and Knowledge-Centered Systems XXVII: Special Issue on Big Data for Complex Urban Systems (pp. 84-110). Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-662-53416-8_6

Benington, J. (2011). From private choice to public value. Public value: Theory and practice, 121, 31-49. https://doi.org/10.1007/978-0-230-36431-8_2

Bao, X. L. (2025). The restructuring of public data ownership allocation. Global Law Review, 47(1), 105-120.

Chu, P. Y., & Tseng, H. L. (2018, April). Open data in support of E-governance evaluation: A public value framework. In Proceedings of the 11th International Conference on Theory and Practice of Electronic Governance (pp. 338-343). https://doi.org/10.1145/3209415.3209433

Callinan, C., Scott, M., Ojo, A., & Whelan, E. (2018, April). How to create public value through open data driven co-creation: a survey of the literature. In Proceedings of the 11th International Conference on Theory and Practice of Electronic Governance (pp. 363-370). https://doi.org/10.1145/3209415.3209457

Chen, L., Jiang, G. Y., & Liu, Y. M. (2025). Study on the economic effect evaluation of realizing the factor value of public data resources in China. Journal of Modern Information, 45(3), 89-102.

Chen, J. D. (2019). The Legal Structure of Smart Contracts. Oriental Law, (3), 18-29.

Du, Q. H. (2020). The realization path of data element capitalization. China Finance, (22), 34-36.

Feng, X., Chen, X. Y., & Pei, L. (n.d.). Models and mechanisms of open government data reuse from the perspective of value co-creation: A case study of Shanghai Public Data Open Platform. Library Journal, (n.d.), 1-25.

Fu, C. R., Kang, J. W., Xu, L. X., & Xue, Y. J. (2024). Study on the asset valuation of public data elements based on the improved cost method. Journal of Wuhan University of Technology (Information & Management Engineering Edition), 46(2), 276-283+298.

Huang, R. H., He, N. D., & Li, B. Y. (2017). Construction of the value system for open government data in China. Library and Information Service, 61(20), 6-11.

Hu, Y. F. (2024). Responsibility allocation, risk sharing, and incentive compatibility: A study on the governance mechanism of authorized operation of local public data in China. E-Government, (10), 22-31.

Huang, Y. X. (2021). On the legal relationship between the state and public data. Journal of Beihang University (Social Sciences Edition), 34(3), 27-31.

Hu, L. (2019). On the legal nature of public data opening in local legislation. Local Legislation Research, 4(3), 1-18.

Huang, Q. Q., Zhao, Z., & Liu, Z. Y. (2022). Study on the comprehensive management system and technical framework of data quality in the scenario of data circulation and transaction. Data Analysis and Knowledge Discovery, 6(1), 22-34.

Jin, M. R., & Fan, J. H. (2025). Building a safe and efficient data circulation system to empower the development and utilization of public data: A case study of Hainan Province's public data development and utilization model. China Economic & Trade Herald, (5), 69-72.

Kassen, M. (2013). A promising phenomenon of open data: A case study of the Chicago open data project. Government information quarterly, 30(4), 508-513. https://doi.org/10.1016/j.giq.2013.05.012

Kucera, J., & Chlapek, D. (2014). Benefits and risks of open government data. Journal of Systems Integration, 5(1), 30. https://doi.org/10.20470/jsi.v5i1.185

Li, T. (2022). Open government data and public data governance: Legislative scope, problem identification, and rule-of-law path. Legal Forum, 37(5), 65-73.

Liu, S. J., & Gao, Q. (2025). The realization of data value and data element marketization: A discussion on key disputes of data capitalization. Exploration and Free Views, (1), 53-61+178.

Magalhaes, G., & Roseira, C. (2020). Open government data and the private sector: An empirical view on business models and value creation. Government Information Quarterly, 37(3), 101248. https://doi.org/10.1016/j.giq.2017.08.004

Ma, F. C., Wu, Y. S., & Lu, H. Z. (2023). Study on the path of value realization of data elements. Journal of Information Resources Management, 13(2), 4-11.

Meng, Q. G., Wang, Y. K., & Wang, L. D. (2024). Opening, utilization and authorized operation of public data: Connotation, models and mechanism methods. Chinese Public Administration, 40(9), 43-53+159.

Men, L. X., Wang, C. H., & Men, Y. L. (2021). Government data opening from the perspective of public value: A literature review and research prospect. Journal of Intelligence, 40(8), 104-110.

Ma, H. Q., Zou, C. L., & Wang, J. (2022). Study on the connotation of users' perceived value of public data and the construction of its measurement scale. Information Studies: Theory & Application, 45(10), 11-18.

Men, Y. L., & Meng, T. G. (2025). Analysis of the structure and mechanism of public data authorized operation from the perspective of digital governance ecology: A case study of Hangzhou. E-Government, (3), 62-75.

Ma, F. C., Xiong, S. Y., Sun, Y. J., & Wang, W. H. (2024). Impact of Data Classified and Graded Rights Confirmation on the Realization of the Value of Data Elements. Journal of Information Resources Management, 14(1), 4-12.

Men, L. X., Wei, J. Y., Mao, J. J., & Chen, C. (2024). Application of large language models in the development and utilization of public data: Prospects, challenges and paths. Information Studies: Theory & Application, 47(11), 70+111-120.

Ouyang, R. H. (2023). Innovating the governance mechanism of public data. Chinese Cadres Tribune, (7), 63-67.

Pan, W. J., Xiao, L. C., Zhan, R., & Ye, Y. T. (2023). Study on the valuation and pricing models of public data and enterprise data: An exploration based on the Guizhou practice of data product transaction price calculator. Price: Theory & Practice, (8), 44-50.

Peng, C. M. (2024). The Intrinsic Mechanism and Development Path of Data Elementization. Administration Reform, (12), 49-58.

Sun, J., & Chen, L. (2025). The value realization mechanism of urban public data and the role of the government. Studies in Science of Science, 43(6), 1336.

Shen, B. (2023). On the identification standards and type system of public data. Administrative Law Review, (4), 64-76.

Song, S. (2024). A functionalist approach should be adopted for public data identification. Zhengfa Forum (China Legal Science), 42(4), 63-76.

Su, J. H., & Lu, H. J. (2025). A review of research on public data value evaluation. Digital Library Forum, 20(11), 10-19.

Veljković, N., Bogdanović-Dinić, S., & Stoimenov, L. (2014). Benchmarking open government: An open data perspective. Government information quarterly, 31(2), 278-290. https://doi.org/10.1016/j.giq.2013.10.011

Wang, B. G., & Ma, H. Q. (2022). Study on the public value of public data: An interpretation focusing on relevant domestic and international policies and reports. Information Studies: Theory & Application, 45(10), 1-10. https://doi.org/10.1155/2022/2412928

Wang, X., & Zheng, L. (2024). "Public" data governance: Scope, objectives, and content framework of public data governance. E-Government, (1), 2-9.

Wang, Y. K. (2023). The connotation, dilemmas, and practical paths of data governance. Social Governance, (3), 4-11.

Wang, X., Liu, D. M., & Li, B. (2018). Promoting and hindering factors of public data opening in China: A case study based on the "Travel Cloud" platform of the Ministry of Transport. E-Government, (9), 2-13.

Wang, X. X., & Wang, R. (2023). The expansion of the concept of public data and its review. Journal of East China University of Political Science and Law, 26(4), 17-27.

Yuan, K., & Liu, H. G. (2020). The government's role and behavioral boundary in public data governance. Jianghan Forum, (5), 120-127.

Yuan, Q. L., & Zheng, L. (2024). Authorized operation or data transaction? A study on the market-oriented circulation and utilization channels of public data: From the perspective of asset specificity and descriptive complexity. E-Government, (10), 14-21.

Yang, D., & Mao, Z. Q. (2023). Institutional construction of public data opening and value utilization. Journal of Beihang University (Social Sciences Edition), 36(2), 36-45.

Zhang, X. D., Huang, Z., & Zhou, D. (2025). Resolving the dilemma of on-exchange transactions: A study on the cultivation mechanism and policies for participants in the data element market. E-Government, (8), 100-112.

Zhong, X. W. (2025). Study on the authorization system of public data authorized operation. E-Government, (2), 85-96.

Zheng, C. Y., & Tang, J. Q. (2021). On the normative meaning of public data. Research on Rule of Law, (6), 67-79.

Zheng, L., & Guan, W. W. (2016). A study on the evaluation framework, indicators and methods of open government data. Library and Information Service, 60(18), 43-55.

Zou, C. L., Ma, H. Q., & Wang, J. (2025). Study on the value release mode and path of public data from the perspective of ecosystem. Library and Information Service, 69(3), 3-13.

Zhang, B., & Wang, W. (2024). "Data value community": An effective strategy for releasing the value of data elements. Hunan Social Sciences, (6), 83-90.

Zhao, X. Y., Zhang, J. N., & Ji, X. F. (2025). Study on the mechanism and path of value release of public open data driven by application scenarios. Information Studies: Theory & Application, 48(4), 12-21+34.

Zuiderwijk, A., & Janssen, M. (2014). Open data policies, their implementation and impact: A framework for comparison. Government information quarterly, 31(1), 17-29. https://doi.org/10.1016/j.giq.2013.04.003

https://doi.org/10.65638/2978-8196.2025.01.03