Research on Trustworthy Data Asset Management

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Abstract: In the era of digital economy, data has become a key production factor and core asset. However, problems such as low data quality, unclear ownership, security and privacy risks, and lack of trust have seriously restricted the full release of data value. This paper aims to systematically study the emerging field of "trustworthy data asset management" and explore its connotation, value, and practical strategies. The research holds that trustworthy data asset management is a systematic project that integrates technology, processes, and governance to ensure that data possesses trustworthy attributes such as authenticity, accuracy, completeness, consistency, security, privacy, and reliability throughout its entire lifecycle of collection, storage, processing, sharing, and application. Combining the digital scenario of the physical industry in the power grid material supply chain and the virtual asset scenario of digital economy represented by the number of fans of celebrities and influencers, this paper analyzes the core challenges and practical value of trustworthy data asset management in different fields, and constructs a comprehensive management strategy system covering strategic planning, technical implementation, process optimization, and governance guarantee. It is expected to provide theoretical reference and practical guidance for organizations to improve the credibility of data assets, activate the potential of data factors, and build a digital trust ecosystem.
Keywords: Trustworthy data assets; data management; data governance; data credibility

1. Introduction

With the rapid development of technologies such as big data, artificial intelligence, and blockchain, data has been deeply integrated into various fields of economy and society, and its status as a new type of asset has become increasingly prominent. However, phenomena such as mixed data sources, inconsistent standards, tampering and forgery, privacy leakage, and vague rights and responsibilities are common, making it difficult for data users to fully trust the quality and security of data. As a result, the "data silo" phenomenon still exists, and the development of the data circulation and transaction market is hindered[1]. Against this background, "trustworthy data asset management" has emerged. Its goal is not only to manage the data itself but also to manage the "trust" behind the data. To deeply analyze its connotation and applicability, this paper selects data from the "power grid material supply chain" and "the number of fans of celebrities and influencers" as cases. Such data, as key virtual assets affecting commercial value, capital market valuation, and public influence, their authenticity and purity directly affect advertising investment, commercial cooperation, and even the fairness of public opinion. Through comparative research on these two types of data assets that are significantly different

but highly characteristic of the times, we can more comprehensively reveal the general laws and differentiated strategies of trustworthy data asset management, and provide an empirical basis for constructing a widely applicable trustworthy data asset management framework [2].

2. Overview of trustworthy data asset management

2.1. Connotation of trustworthy data assets

Trustworthy data assets refer to data resources that have been verified and guaranteed in terms of accuracy, completeness, consistency, timeliness, security, privacy, and compliance, thus being reliably used to support decision-making, drive operations, or create value in specific application scenarios. Its core dimensions include at least: first, trustworthy quality, that is, data truly reflects objective facts or established rules without major errors, omissions, or distortions; second, trustworthy process, that is, the entire lifecycle process of data from generation to demise is traceable and auditable, and operation records are tamper-proof; third, trustworthy security, that is, data is protected during storage, transmission, and processing to prevent unauthorized access, leakage, tampering, or destruction; fourth, trustworthy rights and responsibilities, that is, the ownership, usage rights, and responsible subjects of data are clear and definite, with legal authorization and compliant usage basis. These dimensions collectively form the foundation for evaluating and managing the credibility of data assets [3].

2.2. Key links of trustworthy data asset management

To achieve trustworthy management of data assets, it is necessary to cover the key links of their entire lifecycle. At the data generation and collection end, a reliable source guarantee mechanism needs to be established. In the data processing and integration link, it is necessary to ensure the transparency, consistency, and auditability of calculation logic [4]. In the data storage and sharing link, technologies such as privacy computing, data desensitization, access control, and blockchain evidence storage should be used to promote controlled sharing while ensuring data security and privacy. In the data application and destruction link, it is necessary to establish a scenario-based data credibility evaluation and application audit mechanism to ensure that data usage complies with established purposes and compliance requirements, and that data is securely destroyed at the end of its lifecycle.

3. Value of trustworthy data asset management

3.1. Improve operational efficiency and decision quality, and reduce risks and costs

In the power grid material supply chain, the credibility of data is directly related to the effectiveness of actual operations. By controlling the credibility of data throughout the entire process from raw materials to finished product delivery and withdrawal from the market, power enterprises can dynamically and accurately grasp inventory levels, circulation status, quality records, and depreciation costs. On this basis, precise resource allocation, scientific warehouse configuration, and pre-event protection and maintenance become possible, which greatly reduces the hidden risks of resource hoarding, emergency shortages, and the use of defective products caused by data distortion, improves supply chain reliability, and reduces comprehensive operating costs [5]. For example, when problems occur in key equipment such as high-voltage electrical appliances, the complete lifecycle data, including production batches, each inspection record, and maintenance record, can be directly queried to quickly determine the root cause and form an effective emergency plan; on the contrary, if the data is untrustworthy, decisions will be based on false information, which may lead to huge losses. For the fan economy in social networks, in the marketing activities of merchants, trustworthy data such as real fan numbers, demographic profiles, interaction rates, and conversion rates are important bases for their decisions. Based on real data, merchants can accurately evaluate the influence of celebrities and formulate marketing strategies to improve the return

on investment (ROI) of advertising. If the fan data is excessively inflated, it will cause huge economic losses and image damage to the brand.

3.2. Promote the circulation and value monetization of data factors, and activate the data market

Only by ensuring the credibility and effectiveness of data can it be transformed into production factors and realize circulation and transactions. Power grid enterprises have massive data such as material quality data, equipment operation data, and supplier evaluation data. If the credibility of the data can be guaranteed, it can provide effective services for the enterprises themselves and other units. In addition, it can be provided to suppliers in a de-identified form to improve product quality; it can also be used by insurance companies to formulate more accurate machine insurance clauses, or sold in the data center trading market to bring new economic benefits. But all this is premised on the recognition of the trustworthiness of the demander, that is, trusting the credibility and quality of the data. Similarly, for internet celebrities, MCNs, or social networking sites, the big data they possess, such as fan relationship chains and preference types, are also extremely valuable assets. If third-party endorsement and blockchain technology can be used to confirm the credibility of their data and derived data, it will help enhance their bargaining power in negotiations with advertisers, traffic buyers, and investors. At the same time, a new generation of financial derivatives based on trustworthy data may emerge, such as estimated income warrants based on real influence. Therefore, trustworthy data asset management is an important cornerstone for breaking "data silos" and promoting the development of a diversified data factor market.

3.3. Drive business model and service innovation, and shape a new industrial ecosystem

In addition to improving existing business processes, trustworthy data assets will also spawn new business models and services [6]. Taking the power industry as an example, based on high-credibility full-lifecycle data, "Material as a Service (MaaS)" can be realized, that is, the power industry will no longer sell products but provide customers with maintenance guarantee services supported by reliable data. For insurance companies, they can use real and trustworthy machine operation data to design "on-demand insurance" or "pre-control insurance". For the field of supply chain finance, banks can provide more convenient and low-cost loan services for micro and small operators because banks conduct evaluations based on unforgeable cargo rights certificates and transaction data stored on the chain [7]. In the context of the follower economy, data built using trustworthy influence can provide more accurate "valuation algorithm" products, such as third-party real influence scores; new advertising billing models can also be explored, changing the previous CPM/CPC (Cost Per Mille/Cost Per Click) model to CPA/CPS (Cost Per Acquisition/Cost Per Sale) based on actual conversion effects. In addition, innovative asset securitization products can be issued using the expected income of trustworthy internet celebrities in the future. Therefore, the operation of trustworthy data assets is a key force driving the in-depth development of industrial digital transformation and the transformation from quality and efficiency improvement to model innovation, which is conducive to forming a more open, fair, and efficient new digital economic form [8-10].

4. Strategies for trustworthy data asset management

4.1. Formulate top-level strategy and governance framework, and clarify rights, responsibilities, and standards

First, attach importance to reliable data resource management at the strategic level, formulate goals and roadmaps, establish a management team led by senior executives (such as Chief Data Officer CDO) and composed of various business departments and technical departments, and define the responsibilities and obligations of each role as data owners, data stewards, and data users [11]. For the power grid equipment industry chain, unify key material master data specifications, quality inspection data collection specifications, and industrial chain data exchange rules at the national or industry level; establish a strict quality responsibility system within enterprises, and incorporate data quality evaluation into supplier assessment and enterprise performance appraisal. For the big data of fans of celebrities and influencers, platforms should

assume the main management responsibility, formulate publicly visible data statistics standards, water removal methods, and data release specifications, and accept supervision from industry associations or third parties [12].

4.2. Build an integrated technology platform to empower trustworthiness throughout the lifecycle

The technology platform is the basic supporting means to achieve trustworthy management. It is recommended to build a "trustworthy data asset operation hub" based on IoT perception, blockchain-based evidence storage and preservation, privacy computing, intelligent analysis, and one-item-one-code management. Connect various sensing devices and intelligent terminals to electrical equipment to automatically collect item status and upload and store it in real time [13]; use blockchain smart contracts to automatically complete supply chain collaboration matters, such as payment upon arrival; carry out secure data analysis cooperation with external departments with the help of private computing clouds. In internet celebrity fan management, the computing cloud should embed the latest anti-fraud system to instantly identify and eliminate impersonators; regularly record and store key influence base data on the chain; adopt private identity technology to provide advertisers with accurate crowd portrait analysis services without disclosing user privacy. Platform construction should adopt a modular design with scalability to timely introduce a new generation of trust technologies.

4.3. Optimize end-to-end management processes and embed trustworthy control points

Integrate trustworthy requirements into every link of each business process. Throughout the process from data planning to data demise, in the planning and design phase, it is necessary to put forward requirements and verification standards for data trustworthiness in specific scenarios, such as material tracking and fan value evaluation. In the collection and construction phase, it is necessary to achieve a "trustworthy starting point", collect data automatically in an unalterable manner as much as possible, conduct preliminary review and evidence storage in the shortest time, and adopt strict data quality control mechanisms during storage and processing, such as checking the completeness of material inspection reports and alarming for abnormal fan growth, and record all data processing logs. In the sharing and release process, automatic access control should be implemented according to policies, and the released data should be dynamically de-identified or privacy-enhancing technologies should be adopted; in the application and supervision phase, a data credibility dashboard should be established to monitor the quality, security, and compliant use of key data indicators, and a defective data tracking and repair mechanism should also be established [14]. For example, if it is found that the actual measured values of a batch of power equipment materials are significantly different from the manufacturing values, it should be fed back to the corresponding department to find the cause immediately; if it is found that the number of fans of a certain internet celebrity account has surged abnormally, an audit process should be triggered.

4.4. Cultivate trustworthy culture and ecological cooperation, and conduct continuous evaluation and improvement

People, as a factor, run through the implementation of technology and the process of management work. Enterprises should strengthen the education of employees on data literacy and data trustworthiness, and implement the awareness that "everyone is responsible for ensuring data trustworthiness"; at the same time, establish an incentive mechanism and evaluation system based on data trustworthiness. In addition, the data assets of many enterprises involve parts beyond their own business scope. Therefore, they all need to build an ecological collaboration mechanism. Power supply companies should jointly establish a trustworthy supply chain data collaboration system based on unified technical standards (such as industry blockchain) with suppliers, carriers, testing institutions, etc.; social platforms should also jointly formulate and implement industry fan data credibility standards with MCN companies, advertisers, and third-party regulatory agencies, and discuss deduplication verification across various channels. Finally, we judge that data governance is a continuous iterative process. Therefore, it is necessary to regularly test the effectiveness of the governance system, technology platform, and business processes, evaluate its effectiveness with quantitative standards such as data quality scores, number of data security incidents, data activity ratio, and the proportion of new revenue driven by trustworthy data, and

continuously revise and improve it according to changes in business needs, technological development, and laws and regulations [15].

5. Conclusion

The release of the value of data assets is highly dependent on their credibility. Through systematic research on "trustworthy data asset management", combined with the power grid material supply chain, a benchmark for the digitalization of the physical industry, and the number of fans of celebrities and influencers, a typical asset in the virtual economy, this paper demonstrates the far-reaching value of building data trustworthiness capabilities in improving efficiency, preventing and controlling risks, promoting circulation, and stimulating innovation. The research shows that trustworthy data asset management is a complex system engineering that requires multi-dimensional collaboration of strategic leadership, technical empowerment, process reconstruction, governance guarantee, and cultural cultivation. It is not only a set of tools or methods but also a future-oriented digital survival thinking and core organizational capability. With the deepening development of the digital economy, the advancement of the market-oriented allocation reform of data factors, and the growing social demand for digital trust, trustworthy data asset management will surely change from "optional" to "mandatory". Integrating the concept of trustworthiness into the blood of data is the only way to build a sustainable trust advantage and value high ground in the increasingly fierce digital competition.

Disclosure statement

The author declares no conflict of interest.

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