Postprint: A Digital Rural Construction-Operation Integration Model Oriented Toward Data Element Value Addition

Authors: Zhou Zhian, Jiewei Wang

Date: 2024-10-06T00:00:00+00:00

Abstract

[Purpose/Significance] To implement national strategies for data elements, digital villages, and modern agricultural development, this study explores innovative development pathways for "Data Element ×" modern agriculture, summarizes and refines new experiences and models for data elements empowering high-quality development of the agricultural industry, and aims to assist traditional industries in breaking through development bottlenecks with new quality productive forces.

[Method/Process] Based on reviewing the policy systems and integrated development trends of data elements, digital villages, and agriculture-related data resources in recent years, and employing methods such as policy research, comparative analysis, model analysis, and case studies, this paper innovatively proposes for the first time a Digital Village Construction-Operation Integration Model (DOD) oriented towards data element value appreciation.

[Result/Conclusion] By analyzing the connotation and significance of the DOD model, its operation and revenue models, and using the Funan Digital Village Project and Guangxi Pig Data Authorization Operation Project as examples, this study provides an in-depth analysis of the practical application of the DOD model in digital village data asset special bonds and agricultural industry data authorization operation. Finally, based on case practices and existing challenges, targeted work recommendations are proposed to provide references for local governments to flexibly apply the DOD model, explore and practice using data element value to assist digital village construction, and carry out agriculture-related public data authorization operations, thereby empowering innovative development of the agricultural industry with data elements.

Full Text

Preamble

Journal of Library and Information Science in Agriculture
10.13998/j.cnki.issn1002-1248.24-0381

Data Element Value-Added Oriented Digital Village Construction and Operation Integration Model

Zhou Zhian, Wang Jiewei *

(Beijing Guoxin Junyuan Technology Co., Ltd., Beijing 100007)

Abstract: [Purpose/Significance] To implement national development strategies for data elements, digital villages, and modern agriculture, this study explores innovative development pathways for "Data Elements ×" modern agriculture, summarizes new experiences and models for empowering high-quality agricultural development through data elements, and leverages new productive forces to help traditional industries break through development bottlenecks. [Method/Process] Based on a review of policy systems and integration trends for data elements, digital villages, and agriculture-related data resources in recent years, this study employs policy research, comparative analysis, model analysis, and case studies to innovatively propose, for the first time, a data element value-added oriented digital village construction and operation integration model. [Results/Conclusions] By analyzing the connotation and significance of the DOD model, along with its operation and revenue model, and through in-depth case studies of the Funan Digital Village Project and the Guangxi Pig Data Authorization Operation Project, this paper examines the practical application of the DOD model in digital village data asset special bonds and agricultural industry data authorization operations. Finally, based on case practices and existing challenges, targeted recommendations are proposed to provide references for local governments to flexibly apply the DOD model, explore data element value to support digital village construction, and conduct agriculture-related public data authorization operations, thereby empowering innovative development of the agricultural industry through data elements.

Keywords: data element; digital village; modern agriculture; special bond for data assets; integrated construction and operation

CLC Number: F49

Document Code: A

Article ID: 1002-1248

Citation: Zhou Z A, Wang J W. Data element value-added oriented digital village construction and operation integration model[J]. Journal of Library and Information Science in Agriculture, 2024, 36(5): 43-51.

1.1 Continuous Improvement of Data Element System and Path

Since the Fourth Plenary Session of the 19th CPC Central Committee officially listed data as a production element [1], the State Council and various ministries have issued a series of policy measures to continuously improve the data element policy system and value realization pathways. In December 2022, the State Council issued the "Opinions on Building a Data Basic System to Better Leverage the Role of Data Elements," which pointed the direction for data rights confirmation [2]. In February 2023, the "Overall Layout Plan for Digital China Construction" was issued, establishing digital China construction as a key performance indicator for party and government leaders. In August 2023, the Ministry of Finance issued the "Interim Provisions on Accounting Treatment of Enterprise Data Resources," clarifying data asset entry into financial statements. In September 2023, the China Appraisal Society issued the "Guidance on Data Asset Appraisal," providing institutional support for data asset valuation. In December 2023, the Ministry of Finance issued the "Guidance on Strengthening Data Asset Management," providing institutional guarantees for data asset management. Driven by strong national promotion, various departments have actively explored data assetization. Platforms such as the National Data Asset Registration Service Platform [7] and the Tianjin Data Asset Registration and Evaluation Center [8] have accelerated their deployment, with value realization pathways and cases gradually maturing. Data intellectual property and other forms of value demonstration and protection provide examples and safeguards for the valuation of agricultural industry data assets [9].

Since the "Digital Rural Development Strategy Outline" was issued by the central offices in May 2019 [10], localities have vigorously promoted digital village construction. After five years of development, the policy system has continuously improved, data management and application scenarios have become increasingly rich, demonstration effects have enhanced, and standardization systems have been strengthened, achieving positive results [11]. Building on the careful summary of experiences from the first batch of digital village pilots, in May 2024, the Central Cyberspace Affairs Commission, Ministry of Agriculture and Rural Affairs, and multiple departments issued the "Notice on Launching the Second Batch of National Digital Village Pilot Work," which advances digital village pilot work with emphasis on domain-specific, regionally comprehensive, and mechanism-cooperation types. The pilot covers six major areas including smart agriculture, rural digital governance, rural digital culture, and smart beautiful villages. It encourages government guidance, flexible selection of digital village construction implementation paths, cultivation of more new rural business forms and models [12], with emphasis on agriculture-related data resource value release and construction-operation model innovation exploration, providing unlimited space for forming replicable and promotable typical experiences [13].

In January 2024, the National Data Administration and 17 other departments

jointly issued the "Three-Year Action Plan (2024-2026) for 'Data Elements ×'," which identifies modern agriculture as a key scenario to further promote the release of agriculture-related data value [14]. The "Digital Village Construction Guide 2.0," jointly formulated and issued by the Central Cyberspace Affairs Commission and Ministry of Agriculture and Rural Affairs in May 2024, clearly states the need to accelerate the integration and sharing of agriculture-related data resources, promote data collaboration across the industrial chain, and enhance the digital intelligence level of agricultural production [15]. The "Key Points of Digital Village Development Work in 2024" proposes to accelerate the market-oriented construction and operation models such as government-enterprise cooperation and independent enterprise operation to achieve sustainable operations [16].

2.1 Connotation and Significance

The Data Element Value-Added Oriented Digital Village Construction and Operation Integration Model (DOD) is proposed under the dual strategic background of digital villages and data elements, drawing lessons from the Eco-environment-oriented Development (EOD) model [17]. With full activation of rural data element value as the orientation and integrated construction and operation as the foundation, the government delegates data operation rights through open business scenarios to carry out market-oriented operations of rural data resources, achieving the transformation from data to data resources and then to data assets. This model treats data element value-added as the endogenous driving force for digital village construction, aligning with national policy requirements in data elements and digital villages. It addresses bottlenecks such as insufficient investment capacity in the digital village field, emphasis on construction over operation, and insufficient data value mining. DOD represents an innovative model for promoting rural data element valuation and developing a sustainable digital village operation model through diversified public-private partnerships. Compared with traditional development models, DOD demonstrates advanced characteristics as shown in Table 1 .

2.2 Operation and Revenue Model

The second batch of digital village pilot work aims to break through traditional development bottlenecks and solve government challenges in digital village investment capacity. The DOD model represents a diversified investment and long-term operation model. The "Digital Village Construction Guide 2.0" identifies key investment directions for agricultural industry digital transformation, including government-social capital cooperation where government and social capital invest through fiscal funds, special bond funds, and social funds to build or upgrade agricultural industry digital transformation platforms. Government investment focuses on special bond funds for industry management service scenarios without market operation attributes, covering digital infrastructure, products, and applications. Social capital investment focuses on industry service sce-

narios with strong market operation attributes, promoting agriculture-related data resource development and activating data element value [15]. The synchronized issuance of the "Three-Year Action Plan" proposes developing data products and applications that meet digital village development needs, giving full play to data resource value, exploring agriculture-related public data authorization operations, establishing agriculture-related public data resource registration systems, and implementing disclosure mechanisms for authorization operations. The government authorizes operation rights to agricultural data element innovation operation centers, opens corresponding operation scenarios, and leads data operation and platform operation to release market innovation vitality and improve agriculture-related data resource development and utilization levels. The agricultural data element innovation operation center is recommended to be established as a legal entity by the government locally to conduct market-oriented operations.

The DOD model mainly includes three revenue types: data operation, platform operation, and industry operation, as shown in Table 2 . From the perspective of operation revenue, compared with traditional construction models, after project completion, the DOD model conducts platform and data operations through market-oriented means to fully realize data resource value, exploring diversified operation revenues. While obtaining operation revenue, it enhances digital economy output value, further improves local government tax revenue scale, promotes industrial cluster development, and drives the transformation and upgrading of agriculture to the digital economy. Figure 1 [Figure 1: see original paper] illustrates the DOD model's operation and revenue model.

3.1 Digital Village Data Asset Special Bonds

The Funan Digital Village Project provides strong guidance for industrial park projects. The specific analysis is as follows.

3.1.1 More Diversified Investment and Revenue

According to information disclosed on the China Bond Information Network, the Funan County Digital Village Construction Project in Anhui Province's 37th special bond issuance in 2023 has a total investment of 584.43 million yuan, with fiscal budget arrangement of 304.4252 million yuan (52.09% of total investment) and special bond funds of 280 million yuan (47.91% of total investment), with a bond term of 10 years. The project adopts a construction-operation integration model, including digital village resource databases, collaborative application platforms, and characteristic agricultural product digital factories. The project income mainly consists of data asset operation service income, merchant platform fees for local characteristic malls, and digital factory planting income. This project meets the requirements for applying for local government special bonds under the DOD model, effectively driving quality and efficiency improvement across the industrial chain through market-oriented operations, and transforming digital platforms and formed data assets into diversified revenues. Digital

operation revenue accounts for over 50% of total revenue. During the bond existence period, total data asset operation service revenue reaches 249.9397 million yuan, merchant platform income from local characteristic malls totals 287.4 million yuan, and digital factory planting income reaches 408.4709 million yuan, with total operating revenue of 945.8106 million yuan. Combined data asset operation and platform operation revenue accounts for 55.86% of total operating revenue [18]. This fully demonstrates the important role of the construction-operation integration model oriented by data element value-added in the digital village construction process. It represents a major breakthrough in the process of agricultural industry digital transformation, helping to break the bottleneck of single agricultural project investment return models and providing reference for empowering agricultural industry digital transformation through data element valuation [19]. The revenue calculation standards referenced industry similar products, demonstrating strong feasibility [21]. Revenue types not reflected in this project can be supplemented by referring to the case and the revenue items proposed in this paper.

3.1.2 More Professional Implementation Entities

Traditional agricultural industrial park projects are mostly led by agricultural administrative authorities focusing on traditional agricultural business, unable to effectively focus on data value during platform and data resource planning, construction, and operation stages, easily causing disconnection between industrial resources and data resources [20]. This project is led by the Funan County People's Government, with the Funan County Data Resources Administration taking the lead in implementation. After the completion of agricultural industry digital platform construction, agricultural administrative authorities authorize pig data to enterprise entities with operation capabilities through open business scenarios, building an operation ecosystem to achieve market-oriented operations. This fully demonstrates that in the process of promoting agricultural model innovation, local governments increasingly emphasize the important role of data resource administrative departments in promoting industrial data element innovation and application. Through collaborative cooperation between business authorities and data resource authorities, focusing on industrial development needs accelerates the release of data element multiplier effects. This model can be referenced by agricultural industry digital projects in the planning stage. By linking pig industry chain enterprises, data trading institutions, and financial institutions through data innovation applications, it gives full play to data element value while further activating and upgrading the traditional pig industry, demonstrating the important role of the DOD model in promoting agricultural industry transformation and upgrading and digital economy development. The participation of data resource management departments also provides high reference value for revitalizing data assets in built parks and enabling local industrial digital platforms that have been built but not effectively operated to achieve industry development empowerment through data elements.

3.1.3 More Practical Construction Content and Revenue Logic

The project construction content includes agricultural industry facilities and digital platforms. During planning, full consideration was given to industrial operation, platform operation, and data operation, analyzing payment subjects in each dimension according to market conditions to achieve effective connection of each operation segment. Industry facility construction includes edible fungus digital factories, vegetable digital factories, and artemisia digital factories, conducting full-industrial-chain seedling cultivation, processing, and other production and operation activities, with revenue types mainly being agricultural product sales income and digital factory leasing income from industrial operations. Platform construction mainly includes big data resource databases, rural governance digital platforms, supporting industrial economic analysis, smart agriculture, grid governance, and agricultural product traceability. Revenue types mainly include data service income provided for county/township/village operation centers, merchant platform fees for local characteristic malls, and platform operation income.

3.2 Pig Data Authorization Operation

According to the official website of Guangxi Zhuang Autonomous Region Department of Agriculture and Rural Affairs, in January 2024, based on the "Autonomous Region Public Data Authorization Operation Pilot Work Plan" and the "Autonomous Region Department of Agriculture and Rural Affairs Pig Supply Data Authorization Operation Pilot Implementation Plan," the department launched pig supply data authorization operation pilot work, including data development and utilization and data product operation [22]. This aligns with the DOD model logic for agricultural industry data authorization operations. Through business scenario openness, pig data is authorized to enterprise entities to build an operation ecosystem and achieve market-oriented operations. The specific operation content and revenue points also conform to typical data operation and platform operation in the DOD model. The brief analysis is as follows.

3.2.1 Data Development and Utilization

Data development and utilization refers to the right to process and use, authorizing the data operator to develop and utilize pilot enterprise pig supply data through a secure and reliable platform, including but not limited to data cleaning, processing, and service packaging to form data products. In the data development and utilization stage, the operator mainly invests and relies on the owned processing and usage rights to exert its professional technical capabilities for value mining of data resources, which is also the key to achieving sustainable operations.

3.2.2 Data Product Operation

Data product operation refers to the right to operate data, authorizing the data operator to conduct data product operations for developed data products and provide data value-added services to other organizations. The main revenue comes from trading the formed datasets and from financial and insurance service value-added revenues generated based on data products.

4.1 Increase Diversified Funding Support

The "Notice on Launching the Second Batch of National Digital Village Pilot Work" proposes to increase pilot support, arranging local government special bonds to support eligible digital village construction and encouraging qualified regions to arrange special funds for pilot construction. From an operational perspective, it is recommended that localities learn from the Funan experience in promoting digital village construction, flexibly apply the DOD model to increase special bond support, and achieve principal and interest repayment and sustainable revenue through data element innovation operations. Government fiscal funds should mainly be used for industry and digital infrastructure construction without operational attributes. Special bond funds should prioritize industrial production and operation facilities and digital platform/application construction with certain operational attributes, with principal and interest repayment through data operations. Social funds should mainly be used for scenarios with strong operational attributes that can independently complete market-oriented investment returns. Revenue types can be supplemented by referring to cases and the revenue items proposed in this paper.

From an administrative management perspective, it is recommended to strengthen collaboration between agricultural authorities and data resource authorities, jointly participating in DOD model planning, construction, and operation according to their responsibilities. Agricultural authorities should mainly propose requirements from the perspective of agricultural industry development, focusing on agricultural industry operation, supervision, and project implementation guidance. Data resource authorities should mainly focus on industrial data resource valuation, guiding platform and data operations. When planning agriculture-related public data authorization operations, it is recommended that local governments lead the establishment of data asset operation centers for agriculture-related data, and authorize data operation rights to enterprise entities with operation capabilities through open business scenarios to build operation ecosystems and achieve market-oriented operations. Considering that agriculture-related data element valuation is still in the exploration stage, it is recommended that government platform companies lead the joint efforts with data element operation enterprises to conduct data asset operations through consortia, achieving diversified implementation of "resources + technology + industry + revenue."

4.3 Promote a "Government + Society" Standardized Operation System

Given that the Funan Digital Village Project implementation entity is mainly government-led with low enterprise participation, which is representative but not universally applicable, it is recommended to implement the "2024 Digital Village Development Work Points" that encourage agriculture-related enterprises to establish chief data officers and promote the implementation of national data management standards. Focus on deepening DOD model innovation and conduct regular training in areas such as data resource valuation for agriculture-related enterprises to continuously guide various entities to actively carry out data resource valuation work. Form an industrial data element system jointly built by government and enterprises.

Agriculture-related data value release is an inevitable trend, but the policy system and pathways for data asset valuation in the digital village field are not yet clear [23]. From an industry development perspective, it is recommended that leading agricultural industry institutions and data element service institutions jointly establish an agricultural industry data asset registration and evaluation center to conduct agriculture-related data asset valuation work for agricultural industry chains and governments. Construct a relatively comprehensive data asset system and value realization pathway, and build industry standards such as agricultural industry data asset registration and evaluation specifications and data value evaluation models to solve problems such as lack of leading entities for industry data resources, difficult value evaluation, and non-standardized processes. Simultaneously, guide the industry to further create data products around key scenarios, such as referencing the Guangxi pig data operation case. It is recommended to further research and formulate guidelines for agriculture-related data asset operations, standardization systems such as data resource registration and evaluation specifications and data value evaluation guidelines to guide platform and data operations and promote agriculture-related data resource development and utilization through standardization [24]. Some advanced standard suggestions can be developed as group standards first and gradually upgraded to national standards, advancing agriculture-related data valuation standard formulation in a categorized manner.

References

[1] The Central Committee of the Communist Party of China. Decision on Several Major Issues Concerning Comprehensively Advancing the Rule of Law (adopted at the Fourth Plenary Session of the 18th Central Committee of the Communist Party of China on October 23, 2014)[J]. 2014(22): 4-13.

[2] The Central Committee of the Communist Party of China and The State Council. Outline of the Digital Rural Development Strategy[EB/OL]. [2024-03-01]. https://baijiahao.baidu.com/s?id=1633702803042769194&wfr=spider&for=pc.

[3] The Central Committee of the Communist Party of China and The State Council. Opinions on Building a Data Basic System to Better Leverage the Role of Data Elements[J]. Automation Panorama, 2023, 40(1): 4.

[4] The State Council. Overall Layout Plan for Digital China Construction[J]. China Digital Medicine, 2023, 18(3): 34.

[5] Ministry of Finance. Interim Provisions on Accounting Treatment of Enterprise Data Resources (Cai Shui [2023] No. 11)[J]. Finance & Accounting for Transport, 2023(9): 96.

[6] China Appraisal Society. Guidance on Data Asset Appraisal[EB/OL]. [2024-03-01]. https://dsj.hainan.gov.cn/zcfg/zybs/202309/t20230912_{3492645}.html.

[7] Ministry of Finance. Guidance on Strengthening Data Asset Management[EB/OL]. [2024-03-01]. https://www.gov.cn/zhengce/zhengceku/202401/content_{6925470}.htm.

[8] Big Data Standards Working Group. National Data Asset Registration Service Platform Officially Launched[EB/OL]. [2024-03-01]. https://www.sdss.org.cn/newsinfo/4665579.html.

[9] Ren G L. Tianjin Established a Data Asset Registration and Evaluation Center and the First State-Owned Enterprise Data Asset Entry in Tianjin[J]. Information China, 2024(1): 15-16.

[10] The Central Committee of the Communist Party of China and The State Council. Outline of the Digital Rural Development Strategy[EB/OL]. [2024-03-01]. https://baijiahao.baidu.com/s?id=1633702803042769194&wfr=spider&for=pc.

[11] Jiang H J, Ouyang X. China Digital Village Development Report (2022) Released[J]. Rural Science and Technology, 2023(4): 2.

[12] China Deploys Second Batch of National Digital Village Pilot Work[J]. Rural New Technology, 2024(4): 42-43.

[13] Central Cyberspace Affairs Commission, Ministry of Agriculture and Rural Affairs, et al. Notice on Launching the Second Batch of National Digital Village Pilot Work[EB/OL]. [2024-03-01]. https://www.gov.cn/zhengce/zhengceku/202405/content_{6952504}.htm.

[14] 17 Departments Jointly Issued the "Three-Year Action Plan for 'Data Elements ×' (2024-2026)"[J]. Tendering & Purchasing Management, 2024(1): 6.

[15] Central Cyberspace Affairs Commission, Ministry of Agriculture and Rural Affairs. Digital Village Construction Guide 2.0[J]. Pigs Today, 2023(1): 80.

[16] Central Cyberspace Affairs Commission and Five Other Departments. Key Points of Digital Village Development Work in 2023[J]. Agricultural Engineering Technology, 2023, 43(12): 6.

[17] Su C Y. Study on the Development of Agricultural Industrialization in Dezhou from the Perspective of Rural Revitalization[J]. Dang Dai Xian Yu Jing Ji, 2024(8): 90-91.

[18] China Environmental Protection Industry Association. Eco-Environment-Oriented Development (EOD) Policy and Practice[J]. China Environmental Protection Industry, 2024(4): 37-38.

[19] Fuyang City Funan County Special Bond: Implementation Plan for Funan County Digital Village Construction Project[EB/OL]. [2024-03-01]. https://www.zhuanxiangzhaiquan.com/projectInfomationDetails?projectBatchId=130331&bondId=12662.

[20] Funan County Digital Village Construction Project Non-Standard Special Bond Revenue and Financing Self-Balancing Financial Evaluation Report[EB/OL]. [2024-03-01]. https://www.zhuanxiangzhaiquan.com/projectInfomationDetails?projectBatchId=

[21] Guangxi Zhuang Autonomous Region Department of Agriculture and Rural Affairs. Notice on Application for Pig Supply Data Authorization Operation Pilot Data Operator[EB/OL]. [2024-03-01]. http://nynct.gxzf.gov.cn/xxgk/jcxxgk/tzgg/t17811238.shtml.

[22] Li M M, Li H. Promoting Agricultural and Rural Modernization: Connotation, Measures, Dilemmas and Realization Path—Taking Sichuan Province as an Example[J]. Contemporary Economics, 2024(8): 18-31.

[23] Wang F, Du X L, Zhang Z C, et al. Research on the Construction of Data Element Standard System[J]. China Quality Certification, 2024(7): 34-37.

[24] Wang X B, Tang W F, Liang D, et al. Research on the Management Mechanism of Data-Driven High-Quality Agricultural Development[J/OL]. Chinese Journal of Agricultural Resources and Regional Planning, 2024: 1-7. http://kns.cnki.net/kcms/detail/11.3513.S.20240716.1812.036.html.

Note: Figure translations are in progress. See original paper for figures.