

"Four Dimensional" Dilemma and Breakthrough Path of Empowering Digital Rural Construction with New Quality Productivity

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Abstract Based on the "three new" characteristics of new quality productivity, focusing on the systematic reshaping requirements of digital rural construction, a four-dimensional analysis framework of "subject – tool – object – ecology" is constructed. Research has found that there are four major practical challenges in the process of empowering new quality productivity; a shortage of new types of workers and a mismatch in their skills among labor subjects; the labor tools are manifested as a mismatch between digital infrastructure and rural scenes; the labor objects are facing inertia obstacles in the transformation of industrial data; the external ecology lacks a systematic environment for element collaboration and effective governance. In response to the above difficulties, this paper proposes a systematic breakthrough path; by cultivating digital talents rooted in rural areas, creating truly useful digital tools, designing low threshold industrial transformation paths, and building a governance ecology of co construction and sharing, the coordinated efforts of technology, talent, industry, and environment are promoted, aiming to promote the rooting of new quality productivity in rural soil, and ultimately promoting the emergence of a new landscape of digital rural development with strong endogenous power.

Key words New quality productivity; Digital countryside; Four-dimensional dilemma; Empowerment path; Rural revitalization

DOI 10.19547/j.issn2152 – 3940.2026.01.013

The Third Plenum of the 20th National Congress of the Communist Party of China emphasized the need to "improve and promote the development of new quality production fluid systems"^[1]. Developing new quality productivity is not only a requirement for promoting economic and social development, but also a strategic engine for promoting rural revitalization and accelerating the construction of an agricultural powerhouse. As the direction of rural revitalization, digital rural construction is to systematically reshape the surviving life and production through digital technology, digital concepts and models. In the process of reshaping, the high-tech, high-efficiency, and high-quality characteristics of new productivity provide technical tools, production factors, and industrial forms for the reshaping of digital rural areas^[2].

In theory, the new quality productivity and construction of digital rural areas should be highly systematic. But in practice, the two cannot be better integrated organically. At present, the construction of digital rural areas empowered by new quality productivity mainly focuses on talent shortage^[3], low industrial integration^[4], or exploring their relationships from a single case^[5]. Often, there is a lack of a systematic framework to analyze the complex and dynamic problems encountered in the empowerment process, which leads to limitations and singularity in proposing

countermeasures.

Based on this, this paper breaks free from the limitations of single factor analysis and introduces systematic thinking to construct a four-dimensional analysis framework of "subject – tool – object – ecology". This framework addresses the core issue from four dimensions, namely, in the process of empowering digital rural construction with new quality productivity, what deep challenges do they face in the four interrelated dimensions of labor objects, labor tools, action target, and external environment? How to build a systematic breakthrough path? Studying this issue can not only help us comprehensively grasp the complexity of the empowerment process, but also provide reference for proposing more precise and effective policies, promoting the implementation of new quality productivity in vast rural areas, and unleashing its energy.

1 Intrinsic logical connection between new quality productivity and digital rural construction

New quality productivity is a contemporary advanced productivity that has emerged from revolutionary technological breakthroughs, innovative allocation of production factors, and deep industrial transformation and upgrading^[6]. Its core connotation is reflected in the "three new", namely new laborers, new labor materials, and new labor objects. New workers refer to high-quality talents who master new technologies, knowledge, and skills, and are the driving force behind the development of new productivity. New labor data refers to disruptive digital technologies such as big

Received: December 19, 2025 Accepted: January 28, 2026

Supported by the Research Project on Social Science Development in Cangzhou City (2025271); the Research Project on Basic Research Funds for Hebei Provincial Universities in 2025 (KY2025078).

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data, artificial intelligence, cloud computing, and the Internet of Things, and their software and hardware facilities, which constitute the core tool system of new quality productivity. New labor objects: data has become a key factor of production, traditional industries have been deeply digitized, and new formats such as smart agriculture, rural e-commerce, and digital culture and tourism have emerged. The optimized combination of these three forms an efficient, collaborative, and sustainable advanced productivity system.

The construction of digital countryside is not simply to connect the Internet to the countryside. Its core goal is to achieve the comprehensive revitalization of rural industry, ecological livability, rural style civilization, effective governance and affluent life through digital means^[7]. According to the *Action Plan for Digital Rural Development (2025 – 2030)*, its requirement is to promote the deep integration of digital technology with rural production, life, governance, culture, and ecology, and achieve a transformation in the quality, efficiency, and driving force of rural development.

New quality productivity empowers digital rural construction with its new labor subjects, labor tools, and labor objects: firstly, new labor subjects lead rural transformation, new labor subjects who master digital technology, and new types of workers such as reverse entrepreneurial youth and digital technology parks, help to update rural concepts, and also become the core force for model innovation and organizational change. Secondly, new labor tools can solve the old problems in rural areas, and the new generation of information technology can accurately solve the problems of poor information transmission, uneven public services, and low governance efficiency in rural areas. For example, information-based government services have solved problems such as people running errands and poor information transmission. Thirdly, new labor objects have changed the rural business model. By digitally empowering traditional agriculture and rural three industries, giving rise to new business models such as agricultural product e-commerce, digital rural hotbeds, and customized agriculture, and improving the value chain of rural industries.

2 "Four dimensional" reality dilemma of empowering digital rural construction with new quality productivity

In addition to the fundamental impact of the core three innovations of new quality productivity on digital rural areas, environmental factors also affect the process of empowering digital rural construction with new quality productivity, which is the soil for the effectiveness of new quality productivity. Therefore, in analyzing practical difficulties, in addition to analyzing the labor subjects, labor tools, and labor objects, ecological analysis is also added.

2.1 Labor subject dilemma: shortage of new workers and mismatch of new subject literacy Talents are the source of vitality, but digital villages face severe crises in the process of con-

struction. There are two main difficulties in labor subject: one is the shortage of new workers, and the other is the structural imbalance of new subjects. Due to poor living and working experience and high opportunity costs in rural areas, there is a general shortage of digital skilled workers, and there are even fewer compound talents who understand digital skills and are familiar with agriculture and rural areas. The structural imbalance of new subject is mainly reflected in the cultivation system, where the training programs do not match the actual situation and needs of rural areas. The cultivated students are only good at theory and lack practical ability to solve specific scenario problems, resulting in the phenomenon of underutilization of the cultivated students.

There is a huge gap between rural areas and cities in terms of salary and benefits, career development space, and public service level, which leads to insufficient attractiveness for digital talents. Even if talent is attracted, there is still a problem of talent retention due to an imperfect cultivation system and a lack of supporting industrial ecology and sustained support.

2.2 Labor tool dilemma: mismatch between digital infrastructure and rural scenes At present, although the coverage rate of rural information networks has made progress and the 5G coverage rate in administrative villages has reached over 90%, many digital platforms and intelligent devices invested in the process of digital development have fallen into the dilemma of emphasizing construction over operation, and emphasizing form over effectiveness. These technical tools are often designed to be complex and do not closely fit the daily habits and logic of villagers. Generally, technology is above demand and becomes mere decoration. In addition, due to the single construction subject and lack of overall planning, different systems have different standards and data barriers, forming numerous isolated data islands, and making it difficult for the value of data as a key production factor to effectively circulate and integrate in rural areas.

2.3 Labor object dilemma: inertial obstacle to industrial data transformation Industry is the core object of empowerment, but its transformation faces enormous internal resistance. The resistance mainly manifests in two aspects. One is the ideological concepts and path dependence. For the majority of agricultural producers, mainly small farmers, the traditional production habits and risk avoidance psychology that have been formed for a long time make them cautious or even resistant to digital transformation with high input costs and long effective cycles. Farmers have a realistic mentality of not wanting to transform, not knowing how to transform, and not daring to transform in the production process. The second obstacle is the cost – benefit and business model: the initial investment cost of smart agricultural facilities and digital marketing platforms is relatively high, while agriculture itself has weak risk resistance, resulting in long investment return cycles and high uncertainty. The lack of lightweight, low-cost, and fast acting digital solutions and mature profit models suitable for small farmers has weakened the endogenous driving force of

transformation.

2.4 Ecological dilemma: lack of coordination of supporting elements and systematic environment for effective governance

The external environment is the guarantee for empowering digital rural construction with new quality productivity, but the collaborative ecology has not yet formed. It is mainly reflected in two points: firstly, there are barriers to factor flow and collaborative failure. New quality production factors such as technology, data, talent, and capital face many tangible and intangible barriers when flowing to rural areas. The policies of various departments and various project funds have not been effectively integrated, and there is a phenomenon of individual efforts, making it difficult to form a joint force. Financial capital is hesitant to lend due to high agricultural risks, while social capital is hesitant due to unclear return models. The second is the distortion of collaboration in digital governance: in digital rural governance, a collaborative mechanism with clear rights and responsibilities and compatible incentives has not yet been established among multiple entities such as the government, market, society, and villagers. Sometimes there is a situation where the government intervenes while the villagers watch, and the villagers' sense of participation and gain is not strong, resulting in digital governance floating on the surface and failing to truly stimulate the endogenous power and vitality of rural society.

3 Breakthrough path of empowering dilemma under the "four-dimensional" framework

In the face of the practical difficulties faced by digital rural construction in the dimensions of labor subjects, tools, objects, and ecology, the empowerment process of new quality productivity must break away from a single problem-solving mindset and pursue a deeper and systematic reshaping in the empowerment process. This means that in the process of empowerment, it needs to view technology, digital talent, industry, and environment as an organic whole, and work together to enable advanced productivity to take root and sprout in the soil of rural areas.

3.1 Labor subject: cultivating digital talents rooted in local areas

The main solution to the shortage of digital talents in rural areas is to create an environment that allows digital people to grow and gather in the countryside. This requires a dual approach, activating local potential and introducing external resources. On the one hand, it needs to completely change the way training is conducted, abandoning theoretical teaching and turning to solving real production problems in rural areas. For example, how to sell specialty products well, how to use collecting and managing farmland, and carrying out specific practical teaching to enable high-quality farmers and returning young people to grow into practical digital new farmers through practice. On the other hand, it can flexibly build online platforms and short-term projects to attract experts, engineers, and designers to provide remote guidance and short-term services for rural areas, and transform their experience into low-cost and practical solutions. More importantly, it

needs to increase efforts to improve rural living and working conditions, provide attractive entrepreneurial support and more comprehensive public services, so that digital talents can not only start businesses in rural areas, but also live in peace, ultimately forming a situation where digital talents continue to emerge and vitality bursts forth.

3.2 Labor tools: creating truly useful digital tools

In response to the problem of the disconnect between digital tools and rural scenes, it needs to make a fundamental shift in construction approach, from pursuing equipment and network coverage to pursuing the actual effectiveness of tools and tools to improve villagers' satisfaction. To achieve this transformation, it means that technological development cannot be divorced from reality. Developers and decision-makers need to go into rural areas, understand farmers, and design programs and devices that are easy to operate, durable, and can solve practical problems for farmers based on this foundation. For example, an operating system that can recognize local dialects and a clear village affairs information platform. At the same time, it is necessary to break down the data barriers that hinder information flow, unify data standards at the county level, and effectively integrate information scattered in different fields such as agriculture, finance, and logistics, so that data can flow safely and ensure precise loans, intelligent supply chains, and other services that benefit agriculture, making data a sustainable driving force for rural development.

3.3 Labor target: designing a low-threshold transformation path

To promote the digital transformation of rural industries dominated by small farmers, it is necessary to design practical solutions that are visible, tangible, and affordable, and use tangible benefits to dispel farmers' concerns. In the process of transformation, it should not pursue complete success in one step, but should proceed gradually. It should start with projects with small investments and quick returns. Like developing the sharing economy, it should focus on promoting the model of replacing purchasing with services in the transformation, providing professional services such as drone spraying and online technical consulting that charge by use or area, so that farmers do not have to bear heavy purchasing and maintenance burdens, and can easily enjoy the convenience brought by digitization. At the same time, it aims to create a group of successful models that can be learned from, showcasing how neighbors or peers can increase their income through live streaming and reduce costs through intelligent irrigation by real-life stories, and using replicable experiences to help more people try transformation. In addition, innovative financial and insurance products should also provide financial support and risk protection for farmers, effectively reducing the threshold for their transformation and activating their intrinsic motivation.

3.4 Ecological environment: building a governance ecology of co construction and sharing

To support the better and longer-term development of digital rural areas, a healthy environment is essential. It should build a collaborative environment among diverse entities such as government, enterprises, and villagers. The

government formulates fair and clear systems, constructs infrastructure and platforms, and encourages social forces to participate through guiding funds and other means. More importantly, digital technology should be utilized to enhance the collaborative efficiency of rural society. For example, flexible mechanisms such as point rewards can be established to encourage enterprises, villagers, and other parties to contribute data and wisdom to rural construction. The most important thing is to make the digital platform a convenient meeting room and service window for villagers to use, move village affairs disclosure, project decision-making, and opinion collection online, ensure that every villager can participate and supervise conveniently, and transform digital governance from an abstract concept to a daily practice of gathering community consensus and stimulating internal vitality, laying a solid social foundation for the sustainable development of rural areas.

In the process of empowering digital rural construction with new quality productivity, the ultimate focus should be to make changes in subtle and specific things^[8], finding a stage for labor subjects to belong and showcase themselves in rural areas, allowing labor tools to solve farmers' specific problems, allowing farmers to reap returns in industrial transformation, and achieving consensus in governance during the empowerment process. It needs to connect traditional and modern agriculture through digital means, integrating technology and culture. The ultimate goal is not simply to create a glamorous digital technology, but to root digital technology in rural areas and give birth to digital oases

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It should guide students to apply for national vocational competency certificates related to competitions (such as "Entrepreneurship Consultant") to enhance their employment competitiveness^[3].

3.3 Breaking down disciplinary barriers, and promoting interdisciplinary integration It should expand the scope of competition promotion, mobilize students from all majors in the school, and focus on attracting students from related majors such as design, computer science, and data science to participate.

It should establish interdisciplinary competition workshops, regularly organize case studies, creative storms, and other activities to promote communication and cooperation among students from different majors.

It should establish an interdisciplinary mentor group to provide multi angle and cross disciplinary guidance for participating teams.

In campus selection and evaluation, appropriate emphasis should be given to interdisciplinary teams, encouraging interdisciplinary and integrated innovation.

3.4 Improving competition incentives and guarantee mechanisms, and building a healthy development ecosystem Incentive mechanism: it should link competition results with student innovation credits, scholarship evaluation, and promo-

with strong endogenous power.

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tion of excellence; in the evaluation of teacher professional titles and performance assessments, greater recognition should be given to their contributions in competition guidance.

Resource guarantee: it should increase funding investment, equip with competition specific software, simulation training venues, and data resources to meet the preparation needs of various race tracks.

Organizational support: it should establish a competition working group composed of college leaders, teachers, and student representatives to coordinate resources, regularly study and solve problems, and ensure the orderly progress of the preparation work.

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