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On the Measurement and Improvement Strategies of New Quality Productivity in Chinese Rural Areas

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Abstract

Based on the dialectical relationship between productive forces and production relations, economic base and superstructure in Marxist political economy, this article constructs an indicator system that includes five dimensions: rural new quality workers, labor materials, labor objects, rural governance, and rural culture. Using entropy weight method, Dagum Gini coefficient, and obstacle degree model, the development level of rural new quality productive forces at the provincial level in China from 2012 to 2022 is measured and analyzed. Research shows that the overall productivity of rural areas in China is on the rise, with an average annual growth rate of about 20%. However, the overall level is still relatively low, and there is a non-equilibrium pattern of "eastern>central ≈ western>northeast" among regions; The obstacle level of rural governance is the highest (0.3856), becoming the core constraint factor, followed by insufficient quality of workers and low level of digitalization of labor materials. Differential decomposition indicates that regional differences are the main source of overall differences, and structural barriers are mainly reflected in weak rural e-commerce ecosystems, low agricultural production efficiency, and insufficient cultural resource transformation. Based on this, it is proposed to systematically promote the cultivation of new quality workers, the digital upgrading of labor materials, the diversified expansion of labor objects, the innovation of rural governance mechanisms, and the construction of rural cultural ecology. Differentiated regional strategies should be implemented to promote the comprehensive improvement of new quality productive forces, help rural revitalization and common prosperity.

Keywords

New Quality Productive Forces; Marxist Political Economy; Rural Governance; Rural Culture; Entropy Weight Method.

1. Introduction

General Secretary Xi Jinping first proposed the concept of "new quality productivity" during his inspection in Heilongjiang in September 2023, and emphasized its core role in promoting industrial innovation and giving birth to new driving forces and models through technological innovation at the Central Economic Work Conference in December of the same year. As an advanced productive force born from breakthroughs in technological revolution, innovative allocation of production factors, and deep industrial transformation, the new quality productive force is characterized by high technology, high efficiency, and high quality, and is becoming a new driving force for the high-quality development and comprehensive revitalization of rural areas in China. Traditional agriculture relies on factors such as labor and land, and as the economy shifts towards high-quality development, the opportunity cost of agricultural production increases. From 2018 to 2024, the income of urban residents will always be 2.3-2.5 times that of rural areas, and the income gap between urban and rural areas is significant.

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Developing new quality productivity has become an inevitable choice to narrow the gap and drive high-quality economic development. Therefore, it is necessary to clarify the key issues such as the connotation and characteristics of new quality productive forces, the differences and sources of agricultural new quality productivity, development obstacles and improvement paths. This is of great significance for formulating scientific development policies.

The current academic research on new quality productive forces still focuses on the agricultural field. For example, Zhang Peng and Ji Huimin (2024)[1] analyzed its composition from the three elements of productivity, Li Dongmin and Guo Wen (2024)[2] emphasized the optimization of labor quality, labor material allocation, and labor objects, You Liang and Tian Xiangyu (2024) [3]pointed out that agricultural new quality productivity is a leap forward led by technological innovation, and Gao Yuan and Ma Jiujie (2024)[4] believe that it is an innovative transformation of agricultural production factors and organizations.

The research on measuring new quality productive forces is still in its infancy, and there is no unified standard for constructing an evaluation index system for new quality productivity. The research methods are also different. For example, Lei Xue (2024)[5] used entropy weight TOPSIS method to measure the level of 30 provinces and cities from 2012 to 2022 and analyze regional differences. Shi Xiongtian and Yu Zhengyong (2024) [6]combined this method with visual presentation indicators. Wang Yahong and Wei Yueli (2024)[7] constructed a system to measure agricultural new quality productivity and explore its impact on farmers' income. Judy and Ye Xianglin (2024)[8] constructed a system from three dimensions and found that the development level of grain main sales areas was high and the polarization effect was weakened. Research on the path of improvement focuses more on the technical level. Liu Yanfeng (2024)[9] pointed out that rural digital libraries have problems with technology, resources, and talent, and proposed corresponding solutions. Chu Jinzhe and Zhou Dan (2024) [10]believe that empowering agriculture with digital productivity requires addressing issues such as farmers' digital literacy and outdated facilities, and accelerating the formation of new quality productivity through training, digital transformation, and other means.

Overall, the research on new quality productivity in academia is still in the exploratory stage. Although there have been explorations in theoretical connotations, formation logic, measurement, and other aspects, there are still shortcomings: research mostly focuses on industry and agriculture, and there are relatively few in rural areas; The evaluation system for new quality productive forces does not cover elements such as rural governance and culture, and lacks scientific and unified standards. In view of this, this article will improve from three aspects: comparing rural areas and revealing the connotation and characteristics of new quality productive forces, constructing an indicator system framework based on Marxist political economy that includes laborers, labor objects, labor materials, rural governance, and culture, and using Dagum Gini coefficient to reveal the sources of regional differences and propose improvement measures.

2. Connotation and Characteristics of New Quality Productive Forces

In order to scientifically design a measurement index system for China's new quality productive forces, it is necessary to first have a correct understanding of the connotation and characteristics of China's new quality productive forces. Compared to rural areas, rural areas not only emphasize the agricultural economic foundation, but also emphasize political and cultural functions. The new quality productivity in rural areas consists of new quality rural laborers, new quality rural labor materials, new quality rural labor objects, new quality rural governance, and new quality rural culture.

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2.1. Rural New Quality Workers

In addition to agricultural workers, it also includes workers in township/village enterprises, rural tourism practitioners (tour guides, homestay/farmhouse operators), rural e-commerce practitioners, rural teachers/doctors/grassroots cadres, etc. Rural new quality workers are not only the most active elements in developing new quality productivity, but also participants and decision-makers in rural public affairs. Everyone can use computing power platforms and digital tools to participate in the process of digital production and intelligent services, becoming the main body of innovation and creation[11]. Rural new quality workers integrate high-quality agricultural labor with efficient rural governance. The essence of this identity compound is to re cultivate new quality workers with modern technology, artificial intelligence, digital algorithms, network platforms, and green low-carbon concepts.

2.2. Rural New Quality Labor Materials

In addition to agricultural tools, it also includes a large number of modern industrial equipment, service facilities, infrastructure, and information technology tools such as homestays/farmhouses, catering facilities, entertainment equipment (tourism industry), school/hospital buildings, teaching/medical equipment (public services), etc. These diversified means of production together form the material and technological foundation for the development of new quality productivity in rural areas, promoting the leap of rural economy from traditional agriculture to a diversified and integrated modern industrial system.

2.3. New Quality Labor Objects in Rural Areas

In addition to land and crops, it also includes industrial raw materials (such as wood, ore, and agricultural products processed by township enterprises), parts to be processed (rural manufacturing), tourists (service objects of rural tourism), commodities (rural retail and e-commerce sales), goods to be transported (logistics industry), students/patients (education/medical service objects), land/houses to be constructed (construction industry), and a large number of industrial products, service objects, and artificial objects. These expanded labor objects reflect the continuous expansion of the breadth and depth of rural economic activities, marking the transition of rural production from traditional natural resource development to the creation of value in all factors and multiple fields.

2.4. New Quality Rural Governance

Rural governance is a fundamental project of national governance. Since the new era, China has made historic achievements in improving the rural governance system and enhancing rural governance capabilities. However, at the same time, there are problems such as formalism, bureaucracy, lax party governance, weak public service capabilities, mismatch between production relations and productivity, absence of subjects, and alienation of rights. How to promote the fundamental adjustment of rural social production relations and solve the many difficulties in rural governance has become an essential task in comprehensively deepening agricultural and rural reform and building a high-quality development pattern.

The transformation and improvement of society, culture, and ecology by new quality productive forces is comprehensive, with a focus on new social governance, presenting a pattern of "three governance and one modernization". Firstly, it is the smart governance of rural areas, which includes both smart governance and intelligent governance. The former focuses on rural differences and optimizes governance according to local conditions. The latter relies on digital and intelligent technologies to build digital villages, broaden governance channels, and enhance a sense of governance belonging. Next is rural governance, with the core being institutional improvement. Empowering institutional development and improvement with new quality productivity, real-time monitoring of rural population, flow, and institutional satisfaction, preventing institutional rigidity and alienation, strengthening the organization and

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governance of collective economy, and enhancing management level. Next is rural quality governance, pursuing high-quality governance. Differentiated governance measures should be formulated based on the characteristics of new quality productivity and rural governance in different regions, in line with the requirements of "improving the system and mechanism for developing new quality productivity according to local conditions". Finally, the modernization of rural governance concepts, the promotion of new quality productivity, the upgrading of governance concepts, the updating of governance subjects' cognition, the exploration of the potential of new productivity factors such as technology and digitization, and the promotion of ideological liberation and conceptual innovation through digitization and intelligence[12].

In summary, the new quality productivity provides a core path for solving the problems of rural governance. By constructing a new rural governance pattern of "three governance and one modernization", it can promote the adaptation of rural production relations to the development of productive forces, comprehensively improve governance efficiency, and provide solid support for deepening agricultural and rural reforms and building a high-quality rural development pattern.

2.5. New Quality Rural Culture

Culture is the deep support force for national development. The combination of advanced culture and human beings, as an active factor in productivity, can significantly improve the quality of labor force, expand labor objects, and greatly enhance human ability to create wealth. As an important part of advanced culture, innovative culture is the key to developing new quality productive forces, and the promotion of innovation relies on human subjectivity and cannot be separated from the spirit of innovation and the cultivation of innovative talents. Education provides a core guarantee for this, especially in rural education, which needs to break through traditional textbook knowledge, integrate agricultural theory, practice, and village governance issues, cultivate cross disciplinary talents in rural areas, and help develop new quality productivity in rural areas.

The new quality productivity also profoundly reshapes cultural construction, promotes innovation in concepts, element allocation, technological integration, and other aspects, and gives birth to the "cultural new quality productivity". This is an advanced form of productivity driven by innovation, supported by high technology, and centered on cultural creation and production, which mainly forms three types of new formats in rural areas. One is innovative cultural formats that introduce new elements and creativity to creatively reconstruct rural and traditional culture, such as the construction of a fishermen's mural village and the development of cultural derivatives in Xinjian Village, Dinghai District, Zhejiang Province. The second is the integrated cultural format: the deep integration of culture and technology has given rise to new cross industry models, such as the "Chinese Traditional Village Digital Museum" promoting the digital dissemination of traditional culture. The third is interactive cultural formats: relying on the Internet and social media, consumers participate in the re creation of cultural products, enhance their sense of participation and promote product innovation and upgrading.

In summary, culture and productivity mutually empower and work together in the development of new quality productivity in rural areas. Culture provides spiritual power and talent support for new quality productive forces, while new quality productivity promotes the innovation of rural cultural formats and the formation of cultural new quality productivity. The deep integration of the two is an important path to promote high-quality rural development and achieve comprehensive rural revitalization.

2.6. Summary of Connotation Characteristics

In summary, new quality productive forces is a new productivity system driven by technological innovation as the core, characterized by high technology, high efficiency, and high

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quality, integrating agricultural modernization, intelligent governance, and cultural innovation. The constituent elements include three core elements of rural new quality labor, rural new quality labor objects, and rural new quality labor materials, as well as two core extension elements of rural governance and rural culture. Through a deep understanding of these connotation characteristics and element structures, a scientific basis can be provided for constructing a measurement index system for new quality productive forces, thereby promoting rural revitalization.

3. Construction and Measurement of Indicator System for New Quality Productive Forces

3.1. Indicator System Design

Table 1. Evaluation Index System for New quality productive forces

Primary indicator	Secondary Indicator	Direction	Unit
Rural new quality workers	The coverage rate of digital skills	+	%
	Percentage of rural practitioners	+	%
	The labor productivity of the primary industry	+	%
Rural new quality labor materials	Per capita agricultural machinery total power	+	kilowatt hours per person
	Rural Internet penetration rate	+	households/person
	Green environmental protection investment rate	+	%
Rural new quality labor objects	The proportion of agricultural output value	+	%
	Agricultural meteorological observation station	+	piece
	Fertilizer application / total sowing area of crops	+	
New rural governance	Comprehensive population coverage rate of rural television programs	+	%
	Rural delivery routes/rural population	+	%
	Taobao Village Quantity	+	%
	Engel coefficient in rural areas	+	
	Per capita disposable income of rural residents	+	yuan per person
New rural culture	The original value of productive fixed assets in the cultural, sports, and entertainment industries owned by rural households	+	yuan/household
	Cultural and entertainment rural residents' consumption price index (previous year=100)	+	%
	Rural residents' consumption price index for entertainment, education, cultural goods, and services (previous year=100)	+	%
	Percentage of Education expenditure	+	%

Note: Digital skills coverage rate=proportion of workers who master digital tools (e-commerce, smart device operation). The proportion of rural practitioners=rural practitioners (10000 people)/rural population (10000 people). Labor productivity in the primary industry=Value added in the primary industry/Number of employed people in the primary industry. Per capita total power of agricultural machinery=total power of agricultural machinery/employees in the primary industry. Rural Internet penetration rate=rural broadband access/rural population. Green environmental protection investment rate=local fiscal environmental protection expenditure (in billions of yuan)/local fiscal general budget expenditure (in billions of yuan). The proportion of agricultural output value=total agricultural output value (in billions of yuan)/total output value of agriculture, forestry, animal husbandry and fishery (in billions of yuan). Rural Engel coefficient=rural food, tobacco and alcohol consumption/rural consumption expenditure. Per capita disposable income of rural residents=disposable income of rural residents/rural population. The proportion of education expenditure=local fiscal education expenditure/local fiscal general budget expenditure.

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Based on the connotation characteristics of new quality productive forces, five primary indicators, namely rural new quality laborers, rural new quality labor objects, rural new quality labor materials, rural governance, and rural culture, are selected to construct an evaluation index system for new quality productive forces. The secondary indicators for rural new quality workers focus on optimizing and upgrading the structure of rural workers and their ability to innovate across borders; The secondary indicators for rural new quality labor materials mainly focus on the intelligence, greenness, and modernization of production tools and infrastructure; The secondary indicators of rural new quality labor objects mainly focus on the value enhancement, diversified expansion, and innovation transformation efficiency of labor objects; The secondary indicators of rural governance mainly focus on the level of intelligence and precision in the governance process, as well as the effectiveness of the participation of multiple stakeholders; The secondary indicators of rural culture mainly focus on the innovative expression of cultural resources, the vitality of technological integration, and its driving effect on the economy. The new quality productive forces index system built in this paper is shown in Table 1, which collects statistical data of the whole country and all provinces (autonomous regions, municipalities) from 2012 to 2022 (except Xizang Autonomous Region, Hong Kong, Macao and Taiwan).

3.2. Research Methods

3.2.1. Entropy Weight Method

Based on the designed indicator system, in order to obtain robust data on rural new-quality productive forces across the country and various provinces, this paper adopts the entropy weight method for calculation. The entropy weight method is an objective weighting method that utilizes the magnitude of information entropy to reflect the degree of variation of indicators. The greater the information entropy of an indicator, the greater the degree of variation of that indicator, the more information it provides, and the greater the weight assigned to it. At the same time, based on the linear weighted method, the total score of rural new-quality productive forces in each province is calculated.

3.2.2. Method for Decomposing Regional Differences

This article draws on the Gini coefficient subgroup decomposition method proposed by Dagum (1997) to divide the overall differences in the development level of rural new-quality productive forces into intra-regional differences, inter-regional differences, and super-variable density, thereby revealing the main sources of regional differences in the level of rural new-quality productive forces. The specific expression formula is referred to Liu Huajun and Zhao Hao (2012)[13].

Furthermore, based on the research conducted by Yang Mingyan and Pu Zhengning (2024)[14], this paper employs a decomposition method to analyze the sources of regional differences (DI) in China's rural new-quality productive forces from a structural perspective, revealing the differences in rural new-quality productive forces levels caused by variations in five dimensions: rural new-quality laborers (a), rural new-quality labor objects (b), rural new-quality labor materials (c), rural governance (d), and rural culture (e). The specific expression formula is as follows:

$$var(DI) = cov(DI, a+b+c+d+e) = cov(DI, a) + cov(DI, b) + cov(DI, c) + cov(DI, d) + cov(DI, e) \quad (1)$$

$$1 = \frac{cov(DI,a)}{var(DI)} + \frac{cov(DI,b)}{var(DI)} + \frac{cov(DI,C)}{var(DI)} + \frac{cov(DI,d)}{var(DI)} + \frac{cov(DI,e)}{var(DI)} \quad (2)$$

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Var represents variance, and cov represents covariance. Equation (1) decomposes the differences in rural new-quality productive forces into differences in rural new-quality laborers, differences in rural new-quality labor objects, differences in rural new-quality labor materials, differences in rural governance, and differences in rural culture. Equation (2) measures the contributions of the five aspects-differences in rural new-quality laborers, differences in rural new-quality labor objects, differences in rural new-quality labor materials, differences in rural governance, and differences in rural culture-to the differences in rural new-quality productive Forces.

3.2.3. Obstacle Degree Model

The obstacle degree model can measure the obstacle degree of evaluation indicators for rural new-quality productive forces, and then extract the core obstacle factors that hinder the development of rural new-quality productive forces. The calculation formula refers to Ning Health (2025)[15], as follows:

$$A_{ij} = \frac{B_{ij} \times W_{ij}}{\sum B_{ij} \times W_{ij}} \times 100\% \quad (3)$$

Where, $B_{ij} = 1 - y_{ij}$,y_{ij} is the standardized value of the index; W_{ij} is the weight of the j-th index at level ;A_{ij} is the obstacle degree of a single index to agricultural new quality productivity.

3.3. Analysis of Measurement Results

Based on data at the provincial level across the country, this study reveals the spatiotemporal characteristics of the development of new rural productive forces in China by constructing a comprehensive evaluation index system for new rural productive forces and using the entropy method for weight assignment and calculation. It outlines the trajectory of the new rural productive forces index for the country and the four major regions from 2012 to 2022. The index value increased from 0.371 to 0.444, representing an overall growth of about 20%, reflecting that the rural economy is gradually shifting from being driven by traditional resources to new productive forces characterized by digitalization, greening, and integration. The data is not monotonically increasing: the national index grew steadily from 2012 to 2015, but saw a slight decline in 2016 due to overcapacity reduction and structural adjustment in some provinces, and then rebounded again driven by policies such as the rural revitalization strategy and new infrastructure construction. There is a clear gradient between regions: the eastern region has always maintained the highest level, with an average of 0.463, and the growth rate accelerated from 2013 to 2019, reflecting the comprehensive advantages of digital technology, industrial transformation, and educational human resources; the central region has an average of 0.397, with a slightly lower growth rate, mainly due to slow industrial upgrading and labor outflow; the western region, starting from a low base, has seen the fastest improvement (growth rate of 0.026), with the index jumping from 0.337 to 0.422, reflecting the driving effects of national policies such as the "Western Development" and new infrastructure investment on rural digitalization, ecological protection, and characteristic industries; the northeast region has an average of only 0.346, the lowest among the four regions, and saw a significant decline from 2013 to 2017, which is related to the large proportion of agriculture, population loss, and a single industrial structure. Similar to the findings of research on agricultural new productive forces, the overall national level is still relatively low and follows the pattern of "eastern > central ≈ western > northeast".

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Table 2. Calculation results of new rural productive forces

Year	Nationwide	Eastern Region	Central Region	Western Region	Northeastern Region
2012	0.371	0.410	0.382	0.337	0.354
2013	0.384	0.448	0.400	0.341	0.307
2014	0.383	0.445	0.381	0.352	0.306
2015	0.403	0.442	0.393	0.392	0.339
2016	0.354	0.410	0.351	0.322	0.302
2017	0.377	0.445	0.373	0.333	0.336
2018	0.400	0.472	0.401	0.352	0.353
2019	0.423	0.513	0.415	0.363	0.374
2020	0.425	0.501	0.415	0.382	0.369
2021	0.438	0.508	0.422	0.404	0.368
2022	0.444	0.494	0.432	0.422	0.394
mean	0.400	0.463	0.397	0.364	0.346
growth rate	0.020	0.020	0.014	0.026	0.014

The dimensional analysis reveals significant uneven development among the constituent elements of rural new-quality productive forces. Table 3 compares the regional differences across five dimensions. The national average of rural new-quality labor force is 0.298, with the eastern region leading at 0.357, indicating a good educational foundation and the return of young talents. Both the central and western regions have an average of 0.277, indicating a lack of digital skills and innovation awareness among the labor force in these two regions. The northeastern region has an average of only 0.227, highlighting prominent issues of talent outflow and aging. The national average of the rural new-quality labor resource index is 0.342, with the central region reaching 0.318 due to its better agricultural mechanization foundation, while the eastern and western regions are comparable, and the northeastern region is slightly lower. This indicates that the western region has accelerated its catch-up in agricultural machinery equipment and Internet penetration in recent years. The rural new-quality labor force target index focuses on industrial and resource endowments, with the western and central regions scoring the highest (both around 0.462), indicating that the western region has comparative advantages in ecological agriculture and agricultural product branding, while the central region is supported by major grain-producing areas. Although the eastern region leads in facility agriculture, its cultivated land scale is limited, resulting in a lower index ranking. There are significant differences in the scores of rural governance dimensions, with the eastern region leading at 0.570, reflecting the digitalization of grassroots governance, convenience of public services, and vigorous development of e-commerce. The central and western regions have scores of 0.375 and 0.349 respectively, indicating that governance capacity remains a shortcoming. The northeastern region, affected by population loss and village "hollowing out," scores slightly higher than the western region at 0.420. The rural cultural index is an important indicator reflecting the level of spiritual civilization and cultural industry development, with a national average of 0.438. The eastern and central regions both have scores around 0.5, with the central region ranking second due to its more mature agricultural culture and folk tourism industry. The western region scores the lowest at 0.379 due to the low degree of marketization of the cultural industry, while the northeastern region is dragged down by shrinking industries. The imbalance among these dimensions is consistent with findings in research on agricultural new-quality productive forces, where technological innovation and agricultural labor force are the main advantageous factors, while labor resources and governance dimensions are weak links.

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Table 3. Calculation results of various dimensions of rural new quality productive forces from 2012 to 2022

Measuring dimensions		Eastern Region	Central Region	Western Region	Northeastern Region	Nationwide
rural new quality workers	Mean	0.357	0.277	0.277	0.227	0.298
Rural new quality labor materials	Mean	0.390	0.318	0.329	0.290	0.342
rural new quality labor objects	Mean	0.400	0.462	0.465	0.428	0.440
new rural governance	Mean	0.570	0.375	0.349	0.420	0.432
New rural culture	mean	0.509	0.504	0.379	0.307	0.438

4. Sources of Regional Differences in the Development of New Rural Productive Forces: based on a Spatial Perspective

4.1. Overall Differences

Figure 1 illustrates the overall disparities in rural new-quality productive forces nationwide through the Gini coefficient. The Gini coefficient decreased from 0.117 in 2013 to 0.076 in 2022, indicating a converging trend in overall disparities. The period from 2018 to 2022 saw a rapid decline, which is closely related to the rapid development of rural e-commerce and the promotion of new rural construction. During this period, some impoverished areas achieved improvements in production factors and public services through poverty alleviation efforts. Subsequently, the Gini coefficient tended to stabilize, indicating that development disparities between the eastern, central, and western regions still exist. The within-group disparity decreased from 0.028 to 0.018, indicating that provincial disparities within each region have narrowed. The hypervariable density Gini coefficient remained around 0.01, reflecting that extreme imbalances are rare. Consistent with the findings of research on agricultural new-quality productive forces, the narrowing of overall disparities reflects the role played by national strategies and financial support.

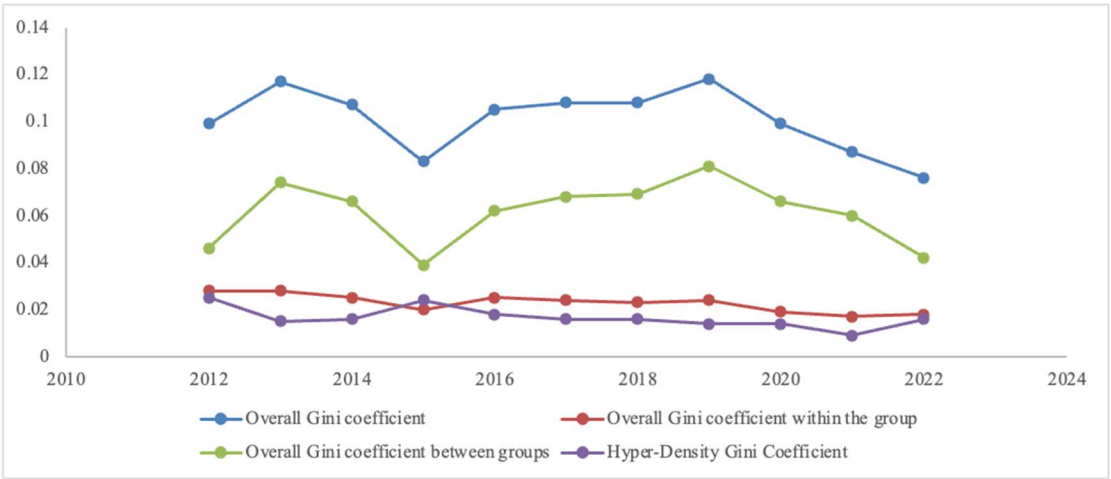

Figure 1. Overall Differences in the Level of New Quality Productive Forces in Rural Areas of China

4.2. Regional Differences.

Figure 2 breaks down the overall disparity into the Gini coefficients within each region. The internal disparities in the eastern region decreased significantly from 2012 to 2015, indicating

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that the eastern region has emphasized regional balance in promoting rural industrial integration and digital infrastructure penetration, with high-quality education, medical care, and e-commerce platforms being implemented in more areas. However, some counties still lag behind due to geographical location or ecological constraints. The internal disparities in the western region are the highest, with a slight decrease over time, benefiting from the Western Development and the "Prosperity of Border Areas and Enrichment of Border Residents" policies, which have narrowed the gap in resource endowments. The internal disparities in the central region remain relatively stable, but have increased since 2016, which may be related to the migration of population from the southeast coastal areas, leading to economic development in counties.

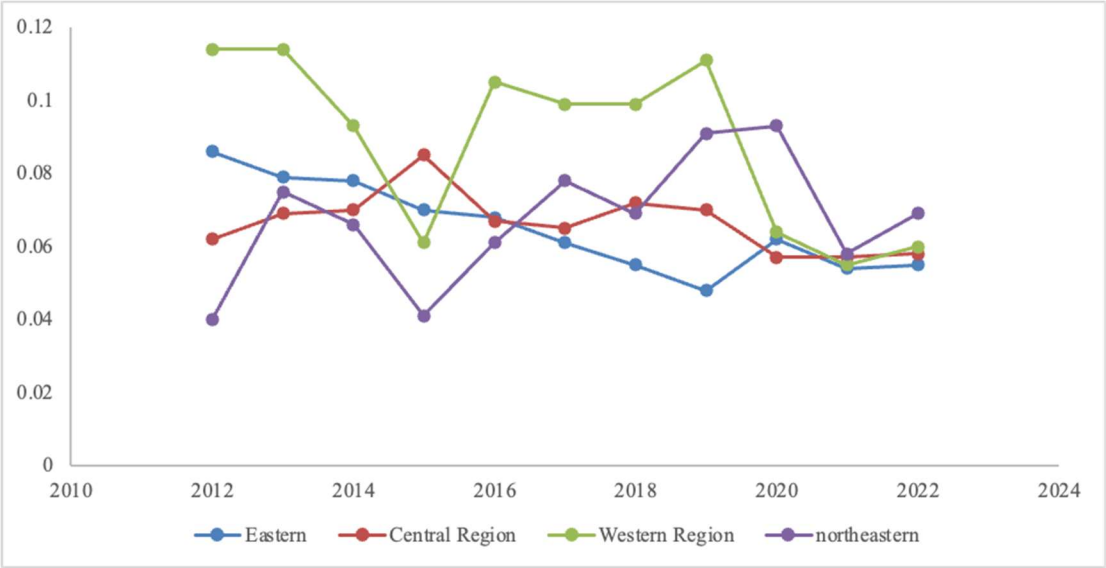

Figure 2. Regional Differences in the Level of New Quality Productive Forces in Rural Areas of China

4.3. Inter-regional Differences.

Figure 3 depicts the disparities and their changes among six pairs of regions. The Gini coefficient, which represents the largest disparity between the eastern and western regions, decreased from 0.112 to 0.073, indicating significant catch-up by the western region in terms of new-quality productivity. This trend aligns with the national "Western Development" initiative and investments in rural revitalization. However, the disparity between the eastern and central regions decreased from 0.081 to 0.067, showing a lower degree of reduction and indicating slow improvement in the central region's new-quality development. This may be attributed to severe industrial homogenization, the loss of high-end talent, and insufficient agglomeration of innovation resources. The disparity between the eastern and northeastern regions also decreased to a lesser extent, reflecting the northeast's long-term reliance on traditional agriculture and heavy industry, which lacks momentum in new industries. The narrowing gap between the central and western regions reflects their gradual convergence in agricultural modernization and information infrastructure construction. The disparity between the northeastern and western regions is also shrinking, primarily due to the rapid growth in the west and the slow growth in the northeast. Consistent with the analysis of new-quality agricultural productivity, the catch-up effect in the west and the lagging performance in the central and northeastern regions are key factors driving these changes in disparities. Policies need to introduce more support measures for the central and northeastern regions, such as cultivating new business entities, enhancing technological innovation capabilities, and improving the business environment.

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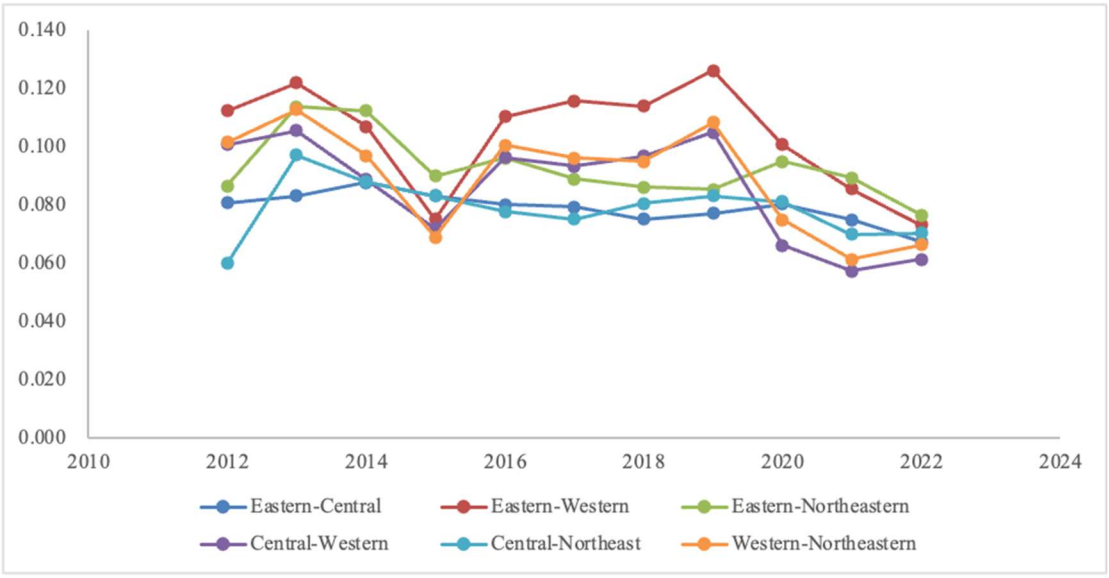

Figure 3. Regional differences in the level of New Quality Productive Forces in rural areas of China

4.4. Source of Differences

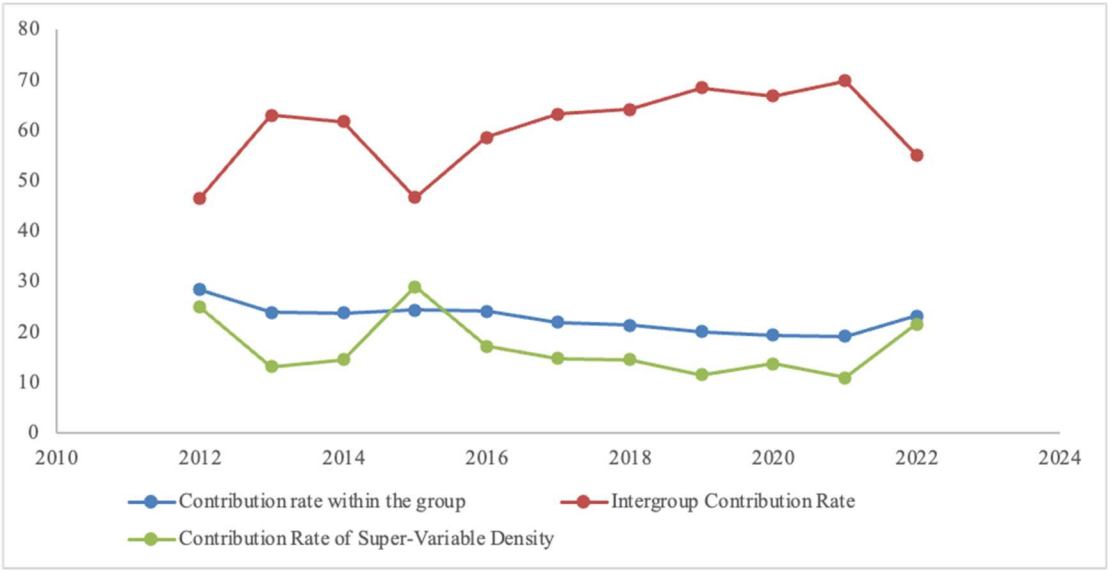

Figure 4. Spatial sources of regional differences in the level of New Quality Productive Forces in rural areas of China (%)

Figure 4 uses Dagum decomposition method to analyze the sources of differences. The results showed that the contribution rate of regional differences was the main source of overall inequality, and it decreased slowly during the study period. This indicates that narrowing the development gap between the four major regions of East, Central, Northwest is the key to improving the level of rural balance; The gap mainly stems from differences in economic development foundation, natural resource endowment, technological innovation, and policy support. The contribution of intra group differences shows a decreasing trend, indicating that the gap between counties within each region is narrowing; The contribution rate of hypervariable density is relatively low, indicating fewer extreme differences. Research on agricultural New Quality Productive Forces has also found that inter group differences are the primary source of disparities. Therefore, future policies should develop differentiated support measures for different regions: for example, the western region should continue to strengthen new infrastructure and ecological industries, the central region should enhance innovation

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capabilities and industrial diversification, the northeast should increase reform efforts to attract talent to return, and the eastern region should consolidate its advantages while transferring mature experience and technology to inland areas, and reduce differences through inter regional collaborative cooperation. In addition, it is necessary to encourage cooperation and resource sharing among counties, enhance governance capabilities and cultural development levels, and gradually narrow intra group differences.

5. Analysis of Obstacles to the Development of Agricultural New Quality Productive Forces

5.1. Obstacle Level of Primary Indicators

Table 4 reveals the key factors hindering the improvement of New Quality Productive Forces in rural areas across the country. From 2012 to 2022, the obstacle levels in the five dimensions remained relatively stable, with the obstacle level in rural governance remaining at around 0.385, significantly higher than other dimensions. This means that weak grassroots public services, insufficient digital infrastructure, and uneven development of collective economy are the most prominent bottlenecks; The obstacle levels of rural new quality labor force and labor resources are about 0.205 and 0.189, reflecting the overall low quality of rural labor force, insufficient agricultural mechanization rate and informatization level; The degree of cultural barriers in rural areas is about 0.195, indicating that public cultural supply, cultural tourism industry, and education expenditure still cannot meet the needs of farmers; The obstacle level of rural new quality labor force is only 0.025, indicating that agricultural material resources and ecological resources are no longer the main factors restricting development. Compared with the research on New Quality Productive Forces in agriculture, where the level of technological innovation and agricultural material resources are the biggest obstacles, the biggest obstacle at the rural level has become the governance system, reflecting that rural development relies more on institutional arrangements, resource allocation, and public service quality. Due to the stability of the index over the years, it can be considered that the importance of governance system reform and talent cultivation has been neglected for a long time. In the future, it is necessary to reduce obstacles by improving the rural governance system, enhancing village collective economy, expanding public service supply, and leveraging the role of village autonomy.

Table 4. Average obstacle level of primary indicators of new quality productive forces in China

year	obstacle degree				
	rural new quality workers	Rural new quality labor materials	rural new quality labor objects	new rural governance	New rural culture
2012	0.2046	0.1891	0.0249	0.3859	0.1955
2013	0.2045	0.1891	0.0249	0.3861	0.1955
2014	0.2045	0.1890	0.0249	0.3861	0.1956
2015	0.2045	0.1890	0.0249	0.3860	0.1956
2016	0.2048	0.1894	0.0248	0.3856	0.1955
2017	0.2048	0.1893	0.0248	0.3855	0.1955
2018	0.2048	0.1893	0.0248	0.3855	0.1955
2019	0.2048	0.1893	0.0249	0.3855	0.1956
2020	0.2049	0.1894	0.0249	0.3853	0.1956
2021	0.2049	0.1894	0.0249	0.3852	0.1956
2022	0.2049	0.1894	0.0249	0.3852	0.1956
mean	0.2047	0.1893	0.0249	0.3856	

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5.2. Obstacle Level of Secondary Indicators

Table 5 further elaborates on specific obstacle factors. From 2012 to 2022, labor productivity in the primary industry has always been a key constraint, with obstacles increasing slightly from 0.1351 to 0.1356. This indicates that the small scale, low level of mechanization, and short value chain of agriculture make it difficult for labor to unleash productivity, and efficiency needs to be improved through moderate scale land management, facility agriculture, and fine management. The obstacle level of per capita total power of agricultural machinery ranks second (0.1338 to 0.1343), indicating that outdated agricultural machinery equipment, low utilization rate, and insufficient popularization of intelligent agricultural machinery are bottlenecks, and it is necessary to increase agricultural machinery subsidies and promote intelligent agricultural equipment. The obstacle level of the number of Taobao villages is the highest (about 0.248), reflecting the insufficient foundation of rural e-commerce, logistics, and digital economy ecology, which significantly restricts the upward movement of agricultural products and the increase of farmers' income; This issue has also been pointed out in the research on agricultural New Quality Productive Forces, as the number of rural e-commerce and new business entities is relatively small. The obstacle degree of the Engel coefficient in rural areas is about 0.0445, indicating that rural residents have a high proportion of food expenditure, a single consumption structure, and insufficient investment in education, healthcare, and cultural consumption. Therefore, it is necessary to improve by increasing income and enriching consumption scenarios. The obstacle level of rural cultural tourism index is about 0.138, indicating a lack of competitiveness in the cultural and tourism industries, insufficient supply of rural cultural infrastructure, and the need to integrate rural cultural resources, develop cultural and creative products, and tourism services. Overall, the top five obstacle factors contribute about 70% of the obstacle degree, and have remained almost unchanged over the past decade, indicating that these deep-seated problems have long-term implications. Policy formulation should focus on rural e-commerce ecology, agricultural production efficiency, cultural tourism integration, and consumption structure optimization.

Table 5. 2012-2022 Top 5 Obstacle Factors and Degree of Obstacles Affecting New quality productive forces

Obstacle factor	2012	2015	2018	2022
Labor productivity of the primary industry	0.1351	0.1350	0.1354	0.1356
Per capita total power of agricultural machinery	0.1338	0.1338	0.1342	0.1343
Number of Taobao Villages	0.2485	0.2485	0.2481	0.2480
Engel coefficient in rural areas	0.0445	0.0446	0.0447	0.0446
Rural cultural tourism and culture	0.1378	0.1379	0.1378	0.1379
Total obstacle degree of 5 major obstacle factors in each year	0.6998	0.6999	0.7003	0.7003

6. Conclusion and Suggestions

The main research conclusions are as follows: The development of New Quality Productive Forces in rural areas presents obvious regional imbalances, and the problem of mismatch between production relations and productivity levels is prominent. Research has shown that the level of New Quality Productive Forces in rural areas presents a gradient distribution pattern of "eastern>central ≈ western>northeast", which is closely related to the economic development foundation and production factor allocation efficiency of each region. Among them, the obstacle degree of rural governance dimension is the highest (0.3856), which deeply reflects the contradiction between the current rural production relations and the level of productivity in the new development stage. Marxism holds that when the relations of

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production cannot meet the requirements of the development of productive forces, they will become shackles that hinder the development of productive forces, and this theory is particularly evident in the field of rural governance.

The development of rural new quality workers is insufficient, and the ability to reproduce labor and create value urgently needs to be improved. Research data shows that the average index of rural new quality workers is only 0.298, with significant regional differences. Laborers are the most active and revolutionary factor in productivity, but in rural areas, problems such as insufficient digital skills and weak innovation awareness directly constrain their ability to create surplus value and promote productivity development. This is essentially a reflection of the lag in knowledge and skill updates during the process of labor reproduction compared to the requirements of productivity development.

Progress has been made in the digital transformation of labor materials, but there is insufficient innovation in the ownership forms of production materials. The research shows that the average value of rural new quality means of labor index is 0.342, of which the penetration rate of intelligent agricultural machinery, Internet infrastructure and other indicators have high barriers. The innovation of labor materials is an important symbol of the development of productive forces, but the ownership form, usage mode, and income distribution mechanism of digital production materials in rural areas are still imperfect, which affects the efficiency of advanced production materials. The means of production in the digital economy era have stronger characteristics of increasing returns to scale, but their diffusion and application in rural areas are still constrained by traditional production relations.

The diversification and expansion of labor objects, but the form of value realization is single, and the mechanism of surplus value distribution is not perfect. The expansion and deepening of labor objects are important manifestations of the development of productive forces, but their value realization must be based on reasonable production relations. The average labor object index reached 0.440, indicating that the breadth and depth of rural economic activities are constantly expanding. However, the low efficiency of value transformation in rural tourism, cultural resources, and other areas reflects the imperfect mechanism of surplus value production and distribution. The value creation and distribution mechanism of new rural formats and models still needs to be improved.

The superstructure has a significant reaction, and governance and culture have become systemic bottlenecks. The obstacles in governance and cultural dimensions reached 0.3856 and 0.1955 respectively, highlighting the counter effect of the superstructure on the economic foundation. The superstructure may promote or hinder the development of productivity. The problems of formalism and bureaucracy in the current rural governance system, as well as the lack of innovative vitality in the cultural field, have to some extent constrained the development of New Quality Productive Forces in rural areas. Especially the weak governance capacity of rural collective economic organizations and the inadequate mechanism for linking interests have directly affected the adjustment and optimization of production relations.

Based on the above conclusions, the policy recommendations proposed in this article are as follows.

Firstly, cultivate new quality workers, stimulate subject creativity, and implement the rural digital skills popularization plan[16]. Establish a three-level digital training system of "county township village", incorporating digital skills such as e-commerce operation and intelligent device operation into compulsory courses for new vocational farmers' training; At the same time, we will improve the incentive mechanism for talent return, provide supporting support such as housing security, children's education, and entrepreneurial financing for returning entrepreneurial talents, establish a talent exchange mechanism between urban and rural areas, establish rural maker spaces and innovation and entrepreneurship incubation bases, and

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provide technical support and market docking services for new workers; Innovate the path for improving the quality of workers, promote the integration of vocational education with industry demand, and incorporate practical content such as modern agricultural technology and business management into rural school curricula.

Secondly, upgrading the means of labor and consolidating the material and technological foundation. Promote the digital transformation of agricultural production materials, increase subsidies for intelligent agricultural machinery and equipment, and establish an agricultural machinery sharing platform; Accelerate the construction of new rural infrastructure, achieve full coverage of 5G networks and the Internet of Things in key agricultural areas, build rural big data centers, improve rural logistics infrastructure, and establish a three-level logistics system consisting of county-level logistics centers, township distribution stations, and village level service points; Promote the application of green production technology, establish a special fund for promoting environmental protection technology, and support green production methods such as water-saving irrigation and organic fertilizer application.

Thirdly, expand the scope of labor and enhance the ability to create value. Deepen the structural reform of the agricultural supply side, cultivate new forms and models of rural industries, support the integrated development of leisure agriculture, rural tourism, rural e-commerce, etc., develop the value of rural cultural resources, promote the revitalization of traditional crafts, build rural intangible cultural heritage workshops, create a number of key villages for rural tourism, promote the construction of characteristic agricultural product brands, and develop geographical indication products and organic agricultural products.

Fourth, innovate rural governance and optimize production relations. Build a "three governance and one modern" governance system, integrate "intelligent governance, institutional governance, and quality governance" with the modernization of rural governance concepts, promote the construction of digital platforms for rural governance, achieve one-stop government services, deepen the reform of rural collective property rights system, explore various forms of collective economic organizations, improve the mechanism of interest linkage, strengthen the training of grassroots cadres, upgrade governance concepts, and enhance the level of digital governance and service capabilities.

Fifth, promote rural culture and enhance spiritual motivation. Implement the rural cultural revitalization project, protect and utilize traditional villages, ethnic villages, and agricultural cultural heritage, while promoting the integration of culture and technology, developing new formats such as digital culture and creative agriculture, building rural digital museums and rural cultural activity centers, and carrying out mass cultural activities.

Sixth, attention should also be paid to the implementation strategy of regional differentiation. Eastern region: Focus on improving governance efficiency and cultural innovation, and play a leading role in demonstration. Central region: Strengthen the improvement of workers' quality and upgrading of labor materials, and promote the optimization of industrial structure. Western region: Highlighting the transformation of ecological resource value and the excavation of cultural characteristics, achieving leapfrog development. Northeast China: Focus on institutional and mechanism innovation, talent return, and revitalize rural development vitality.

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References

[1] Zhang Peng, Ji Huimin. Research on the Scientific Connotation and Practical Path of New Quality Productivity: Analysis from the Perspective of Production Factors. Journal of Changchun University, 2024,34(05):43-48.

[2] Li Dongmin, Guo Wen. The Rich Connotation, Generating Logic, and Contemporary Implications of New Quality Productivity [J]. Research on Technology, Economics, and Management, 2024,(04):8-13.

[3] You Liang, Tian Xiangyu. Agricultural New Quality Productivity: Realistic Logic, Connotation Analysis, and Generation Mechanism [J]. Economic Issues, 2024,(06):27-35.

[4] Yuan Gao, Ma Jiujie. Agricultural New Quality Productivity: A Political Economy Perspective [J]. Agricultural Economic Issues, 2024,(04):81-94.

[5] Lei Xue. Measurement of China's new quality productivity level, decomposition of regional differences, and dynamic evolution [J]. Industrial Technology and Economics, 2024,43(06):30-39.

[6] Shi Xiongtian, Yu Zhengyong. Measurement, Structural Decomposition, and Spatial Convergence Analysis of Regional New Quality Productivity in China [J]. Industrial Technology and Economics, 2024,43(05):90-99.

[7] Wang Yahong, Wei Yueli. The Impact of Agricultural New Quality Productivity on Farmers' Income Increase [J]. Journal of Agriculture and Forestry Economic Management, 2024,23(04):446-455.

[8] Judy, Ye Linxiang. Green Resilience of Chinese Agriculture: Horizontal Measurement and Spatiotemporal Evolution [J]. Statistics and Decision making, 2024,40(13):118-123.

[9] Liu Yanfeng. Empowering the Construction of Rural Digital Libraries with New Quality Productivity: Mechanisms of Action, Practical Obstacles, and Practical Paths [J]. Library Theory and Practice, 2024,(06):43-49.

[10] Zhu Jinzhe, Zhou Dan. The Significance, Constraints, and Optimization Path of Empowering Agricultural Economy with New Quality Productivity for High Quality Development [J]. Contemporary Rural Finance and Economics, 2024,(05):40-44.

[11] Mikaning, Li Dayu, Dong Changqi. New quality productivity driven by computing power: essential characteristics, basic logic, and modernization of national governance [J]. Journal of Public Administration, 2024,21(02):1-14+170.

[12] Zhao Guangyuan. Zhao Guangyuan: New Quality Productivity and New Governance of Rural Society [J]. China Rural Discovery, 2024,(04).

[13] Liu Huajun, Zhao Hao, Yang Qian. Regional disparities and influencing factors in the development of China's brand economy: an empirical study based on Dagum Gini coefficient decomposition method and data from China's top 500 brands [J]. Economic Review, 2012,(03):57-65.

[14] Yang Mingyan, Pu Zhengning. Measurement of inter provincial digital technology innovation level and regional differences in China [J]. Statistical Research, 2024,41(02):15-28.

[15] Ning Jiankang, Wang Guirong, Meng Xiaoxian, etc. China's Agricultural New Quality Productivity: Statistical Measurement and Spatiotemporal Evolution [J/OL]. Research World, 1-15 [2020-09-19].

[16] Jia Jin, Lu Jinpeng. The logical implications, practical challenges, and development directions of promoting modernization of rural governance through new agricultural quality productivity [J]. 2025,24(2):26-34.