Cultivation Logic, Practical Dilemmas and Differentiated Development Paths of New Quality Productive Forces in Underdeveloped Western China

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Abstract: Fostering new quality productive forces (NQPF) is critical for underdeveloped western China to break development bottlenecks in the new-era western development strategy. Based on Marxist productivity theory, this paper clarifies its three-dimensional cultivation logic. Using 2012–2022 panel data of 12 western provinces, this study measures NQPF levels and regional disparities by improved entropy weight-TOPSIS and Dagum Gini decomposition, and identifies practical dilemmas. Results show steady growth, prominent east-west gaps, three-echelon differentiation and five core dilemmas, providing references for western high-quality development.

***Keywords*:** new quality productive forces; underdeveloped areas in western China; regional differences; differentiated development; high-quality development

1. Introduction

In September 2023, President Xi proposed new quality productive forces (NQPF) during his Heilongjiang inspection, emphasizing that NQPF — innovation-driven, high-tech, efficient and high-quality — is a key direction for China's high-quality development[1]. In April 2024, the Forum on Promoting Western Development in the New Era required western regions to "develop NQPF tailored to local conditions" as a core task[2][9]. As China's ecological, energy and security barrier, western China has progressed greatly in over 20 years, yet still faces extensive industrial structure and weak innovation, making the traditional resource-driven model unsustainable[3]. Cultivating NQPF is thus essential to break path dependence and achieve leapfrog development.

Research on NQPF is abundant. Zhong Maochu analyzed its evolution, defining NQPF as advanced productivity from replacing traditional factors with new core factors, with digital-green integration as the main industrial carrier[4]. Pu Qingping et al. clarified its generation, innovation and epochal value, noting NQPF is innovation-led, talent-supported and industry-based, advancing Marxist productivity theory's Sinicization and modernization[1]. Zhou Hongjie et al. empirically confirmed that the digital economy boosts NQPF via industrial upgrading and innovation, revealing how digital–real integration drives productivity growth[5].

However, studies focused on underdeveloped western regions remain limited, mostly qualitative, lacking quantitative measurement and differentiated paths. This paper examines 12 western provinces, combining normative and empirical analysis to interpret NQPF's three-dimensional logic, measure regional levels and disparities, identify dilemmas and causes, and propose differentiated paths. Its contributions include deepening theory, filling quantitative gaps, and providing practical guidance.

2. Theoretical Connotation and Core Logic of New Quality Productive Forces Cultivation in Underdeveloped Western Regions

2.1 Theoretical Connotation

NQPF is an epochal innovation and Sinicization of Marxist productivity theory. It is advanced productivity driven by tech breakthroughs, factor innovation and industrial transformation, with innovation as the core and high-quality development as the goal. It unifies material and spiritual productivity and reflects systemic tech-organizational changes[6].

NQPF has three core dimensions:

Sci-tech productivity: core driver to reduce western resource dependence;

Green productivity: aligned with western China's ecological security role;

Digital productivity: key to overcoming geographic barriers and enabling catch-up growth[7].

NQPF arises from replacing traditional factors(capital, resources, labor)with data, technology and talent. For western

regions long reliant on resources, nurturing NQPF is critical to shifting from factor-driven to innovation-driven growth[8]. Instead of copying the east, western regions should pursue locally adapted, distinctive paths.

2.2 Core Logic

NQPF cultivation in western regions follows historical, theoretical and practical logic.

Historical logic: a necessity to overcome resource dependence and achieve catch-up. Western development brought resource-based expansion but also extensive growth and widening east–west gaps. At the high-quality development stage, traditional models face bottlenecks; only NQPF can break path dependence and enable innovation-driven growth.

Theoretical logic: an extension of Marxist productivity theory and regional coordination. Marxist political economy stresses the unity of productive forces and relations; NQPF requires upgrading core factors and optimizing institutions, aligning with coordinated development and common prosperity, boosting western momentum and narrowing regional gaps.

Practical logic: a core task of new-era western development and a way to convert western advantages into strengths. The Western Development Forum mandates local NQPF development. As the East Data&West Computing Project hub, western China has rich clean energy, cultural tourism and border location advantages; NQPF can translate these into growth, balance multiple goals, and advance Chinese-style modernization in the west.

3. Development Status and Regional Difference Characteristics of New Quality Productive Forces in Underdeveloped Western Regions

This paper constructs a comprehensive evaluation system for new quality productive forces, taking scientific and technological, green and digital productivity as first-level indicators. Using 2012-2022 panel data of 12 western provinces, it measures each province's development level via the improved entropy weight-TOPSIS method, and analyzes regional differences with the Dagum Gini coefficient decomposition method. Results show that NQPF in western China rose steadily from 0. 037 to 0. 114 during 2012–2022, achieving phased progress.

Core characteristics include: low overall level (the 2022 western average score is only 41.3% of the eastern regions), obvious internal gradient differentiation with a clear-core periphery pattern, prominent structural imbalance (sci-tech productivity ranks first, digital productivity second, green productivity the lowest), and significant club convergence and Matthew effect that hinder cross-echelon upgrading and widen regional gaps[7].

The echelon division and ranking of the development level of new quality productive forces in the 12 western provinces are shown in the following table:

Table 1. Average Score and Ranking of New Quality Productive Forces in Western Provinces (2012-2022)

Province/Region	Average Score	Ranking	Echelon Division
Chongqing	0.572	1	First Echelon
Sichuan	0.546	2	First Echelon
Shaanxi	0.489	3	First Echelon
Guangxi	0.387	4	Second Echelon
Yunnan	0.375	5	Second Echelon
Guizhou	0.368	6	Second Echelon
Inner Mongolia	0.352	7	Second Echelon
Gansu	0.312	8	Third Echelon
Xinjiang	0.297	9	Third Echelon
Qinghai	0.272	10	Third Echelon
Ningxia	0.231	11	Third Echelon
Xizang	0.208	12	Third Echelon

From Dagum Gini decomposition shows that the overall average Gini coefficient of NQPF in western China is 0.433 with a fluctuating upward trend, indicating serious regional imbalance. The average annual contributions of intensity of transvariation, inter-regional disparity and intra-regional disparity are 44.53%, 37.49% and 17.98%, following the pattern: intensity of transvariation > inter-regional disparity > intra-regional disparity. This suggests overlapping development across echelons is the main source of regional disparity, and inter-echelon gaps are a key driver of imbalance.

For echelon characteristics, the first echelon(Sichuan, Chongqing, Shaanxi), relying on the Chengdu-Chongqing National Science and Technology Innovation Center and Xi'an's sci-tech innovation resources, holds a significant leading

edge in advanced manufacturing, digital economy and sci-tech innovation, becoming the core growth pole of these forces in western China. The second echelon(Guangxi, Yunnan, Guizhou, Inner Mongolia), based on its characteristic endowments, has formed differentiated advantages in digital economy, green energy, cultural tourism and other fields, with a relatively fast growth rate of these forces yet still lags behind the first echelon. Constrained by geographical location, industrial foundation, innovation capacity and other factors, the third echelon(Gansu, Xinjiang, Qinghai, Xizang, Ningxia)has a generally low level of these forces, making it the key short-board area for their cultivation in western China.

4. Practical Dilemmas and Underlying Causes of New Quality Productive Forces Cultivation in Underdeveloped Western Regions

Despite unique endowments and policy support, cultivating new quality productive forces(NQPF)in underdeveloped western regions faces deep-seated dilemmas, the core bottleneck for regional development.

Weak industrial foundation restricts the conversion of new and old drivers. Western industries are dominated by low-end, resource-based sectors with low value-added. Strategic emerging industries are small and weak. Blind layout leads to homogeneous competition and redundant construction. The root cause is insufficient endogenous momentum and lack of benign interaction between traditional and emerging industries, leaving NQPF without a solid industrial carrier.

Insufficient agglomeration of innovation factors weakens sci-tech driving force. In 2022, the 12 western provinces had an average R&D intensity of 1.12%, basic research expenditure share of 6.09%, and enterprise basic research input below 5%, all far below the national average. They also face a shortage of high-end talents, serious brain drain, insufficient innovation platforms, and a sci-tech achievement conversion rate below 30%. Unlocalized industrialization brings key technology “chokepoint” risks and restricts sustained momentum.

Lagging digital economy underutilizes digital-real integration. As a key NQPF carrier, digital economy(digital/industrial digitalization as core paths[10])has proven enabling effects[11]. However, western China has digital infrastructure gaps(high construction costs, full-coverage difficulties), small-scale digital industrialization(no core clusters), slow traditional industry digital transformation(SMEs lack willingness/capacity), incomplete data factor markets, and unreleased multiplier effects.

Inefficient green resource conversion and imperfect ecological-economic mechanisms. As China's ecological barrier, western regions take green development as NQPF's distinctive background(digital-green integration as key path). Yet ecological product value realization, horizontal compensation mechanisms, and accounting systems are imperfect, making it hard to convert"lucid waters and lush mountains"into"gold and silver mountains". Clean energy development is insufficient(short industrial chain), green tech is weak, high energy-consuming industry transformation lags, and green productivity is sluggish — failing to turn ecological advantages into development strengths.

Inadequate institutional adaptability and mismatched guarantees. NQPF development needs compatible production relations and institutions. Western China lags in factor market reform(core factor flow barriers, regional market segmentation); most policies copy the eastern model, poorly adapting to local endowments/stages. Imperfect innovation incentives and fault tolerance mechanisms fail to stimulate market entities/local governments. Inadequate macro governance struggles with new technologies' creative destruction, failing to balance development/security and efficiency/equity — restricting NQPF's sound development.

5. Differentiated Development Paths for the Cultivation of New Quality Productive Forces in Underdeveloped Western Regions

To solve dilemmas and regional heterogeneity, this paper constructs five differentiated paths based on local endowments, industrial foundations and development stages.

5.1 Build a differentiated modern industrial system.

The first echelon (Sichuan, Chongqing, Shaanxi) should leverage sci-tech and industrial strengths to develop strategic emerging industry clusters and future industries, and build core growth poles. The second echelon (Guangxi, Yunnan, Guizhou, Inner Mongolia) should pursue staggered development based on local endowments, focusing on green computing power, border industries and clean energy. The third echelon (Gansu, Xinjiang, Qinghai, Xizang, Ningxia) should extend characteristic industrial chains and develop border trade and eco-tourism to avoid homogeneity, forming a complete, advanced and secure modern industrial system.

5.2 Construct a multi-level sci-tech innovation system.

Improve the national sci-tech innovation system, strengthen strategic sci-tech layout, advance east-west sci-tech

cooperation and industry-academia-research integration to address insufficient resources. Implement echelon-based innovation strategies:

First echelon: Focus on key core technology breakthroughs and basic research to improve local achievement conversion.

Second/third echelons: Focus on applied tech innovation and achievement transformation, undertaking advanced technologies via east-west cooperation. Improve talent introduction/cultivation/retention mechanisms, roll out targeted policies, and foster NQPF-adapted workforces.

5.3 Deepen digital empowerment.

Rely on the East Data&West Computing Project to accelerate digital infrastructure and narrow the digital divide. Promote hierarchical digital transformation of traditional industries(differentiated solutions for large enterprises/SMEs)and deepen digital-real integration. Foster characteristic digital industries: first echelon builds core digital economy clusters[12]; second/third echelons develop local characteristic digital services. Improve market-based data allocation, promote cross-regional circulation, and release the multiplier effect[11].

5.4 Promote green-low-carbon transformation.

Coordinate high-level protection and high-quality development, improve ecological product value realization, horizontal compensation mechanisms, and accounting systems to convert"lucid waters and lush mountains"into"gold and silver mountains". Rely on clean energy endowments to strengthen the national energy base, extend the new energy industrial chain, build wind-solar-hydro-storage clusters, and enhance West-East Power Transmission capacity. Promote energy conservation/carbon reduction in high energy-consuming industries, improve green tech innovation, facilitate digital-green integration, and convert ecological endowments into development advantages.

5.5 Improve institutional guarantees.

Optimize institutional supply, deepen factor market reform, break market segmentation, and promote efficient core factor flow. Improve regional coordinated development and east-west cooperation mechanisms for complementary advantages. Optimize differentiated policies(precise echelon policies, avoid"one-size-fits-all"); improve innovation incentives and fault tolerance mechanisms to stimulate vitality. Enhance macro governance to respond to new technologies' creative destruction, balance efficiency/equity and development/security, ensuring development fruits benefit all.

6. Conclusion and Outlook

This study finds that cultivating NQPF is a historical necessity for western China to break bottlenecks and achieve catch-up growth, an epochal extension of Marxist productivity theory, and a practical requirement of the new-era western development. From 2012 to 2022, NQPF in western China grew steadily but still lagged far behind eastern regions, with three-echelon differentiation, structural imbalance, club convergence and Matthew effect. Its cultivation faces five core dilemmas: weak industrial foundation, insufficient innovation momentum, lagging digital empowerment, inefficient green resource conversion, and inadequate institutional adaptability, rooted in path lock-in, insufficient innovation factors and institutional barriers. To solve these dilemmas, we should adopt locally adapted and targeted policies, and build five differentiated paths to promote the characteristic development of NQPF.

This paper enriches theoretical and empirical research on these forces in underdeveloped regions and provides practical guidance for their cultivation in western China, yet has notable limitations. First, the research focuses on the provincial level, lacking county-level analysis. Second, the empirical analysis of factors influencing these forces' development requires further deepening. Third, there is no in-depth typical case analysis or summary of replicable practical experience. Future research can extend to the county level, deepen empirical analysis of influencing factors, and summarize promotable cultivation models with typical cases, to provide more precise theoretical and practical support for western China's high-quality development.

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