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New-Quality Productive Forces: Theoretical Frameworks and Policy Implications in the Digital Economy Era

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Abstract: With the rise of the digital economy, new productivity is becoming a key driving force for economic growth and social change. With artificial intelligence, big data, cloud computing and other technologies as the core, and data-driven, intelligent decision-making and collaborative innovation as the distinctive characteristics, the new quality productivity puts forward new requirements for traditional production methods and governance models. However, different countries exhibit very different characteristics in managing the new quality of productive forces due to differences in political systems. From the perspective of comparative politics, this paper explores the similarities and differences between democratic and authoritarian political systems, constructs relevant theoretical frameworks, and analyzes the advantages and disadvantages of policy design and implementation based on the practical experience of typical countries (such as the United States, Germany, China, and Singapore). The results show that in the democratic system, the management model pays more attention to market leadership, data transparency and technological innovation, but there are challenges in data privacy protection and regulatory efficiency. However, under the centralized system, state-led strategic planning has obvious advantages and high policy implementation efficiency, but it may face innovation constraints and privacy disputes brought about by technology centralization. These differences reflect the diversity of resource allocation and governance logic under different systems. This paper further points out that the management of new productivity faces multiple challenges, such as technological ethics, policy lag, transnational collaboration and social inequality, and puts forward policy suggestions, including strengthening the construction of international cooperation framework, promoting multi-party collaborative governance between government and society, and optimizing the balance between social equity and technological innovation. The purpose of this study is to provide theoretical support and practical enlightenment for new quality productivity management in the context of globalization, and to contribute to the sustainable development of the digital economy era.

Keywords: New Productivity; Digital Economy; Comparative Politics; Collaborative Governance; Policy Implications.

1. Introduction

1.1. Background

1.1.1. The Rise of the Digital Economy Era and its Impact on the Global Economic Model

In recent years, the digital economy has risen rapidly and become an important driver of global economic growth. According to international statistics, the scale of the global digital economy has exceeded 30 trillion US dollars in 2020, accounting for more than 40% of global GDP. The widespread application of digital technologies, such as artificial intelligence (AI), big data, cloud computing, and blockchain, is driving the digital transformation of traditional industries, subverting traditional production and management methods. This trend has not only changed the mode of resource allocation, but also reshaped the connotation of productivity, forming a new qualitative productivity with technological innovation as the core.

In the context of the digital economy, governments are facing new challenges in their governance models: on the one hand, they need to respond flexibly to the rapidly changing technological environment; On the other hand, it is necessary to find a balance between promoting innovation and ensuring equity. At the same time, different political systems show significant differences in the management of new quality productivity. For example, democratic systems focus on market-driven and data-transparent systems, while centralized systems focus on strategic planning and policy implementation efficiency. These differences form the core of this article.

1.1.2. Definition and Characteristics of New Quality Productivity

New quality productivity refers to the form of productivity driven by digital technology and emerging technologies such as artificial intelligence, big data, and cloud computing. Compared with traditional productivity, new productivity has the following significant characteristics:

(1)Intelligent: The production process is highly automated and intelligent, relying on AI technology to achieve accurate prediction and dynamic adjustment.

(2)Data-driven: Data is the core factor of production, and value is generated through collection, analysis, and application.

(3) Collaborative innovation: Cross-industry and cross-regional collaboration has become the mainstream, and innovation is no longer confined to a single organization, but maximizes value through open collaboration.

These characteristics make the new quality productivity show great potential to improve economic efficiency, optimize resource allocation, and promote technological

innovation. However, how to effectively manage the new quality of productivity, maximize its efficiency, and avoid technology abuse, privacy risks and other issues has become a common concern of governments and academia.

1.2. Research Problems

Based on the characteristics of new qualitative productivity and its far-reaching impact on the global economy and governance model, this paper focuses on the following two key questions:

1.2.1. How Does the New Qualitative Productivity Affect the National Governance Model?

The rise of new quality productivity has changed the traditional logic of resource allocation and governance mode. In this article, we will analyze how technology is reshaping government functions, the way public services are delivered, and cross-sectoral collaborations.

1.2.2. What are the Similarities and Differences in the Characteristics of New Productivity Management under Different Political Systems?

There are significant differences between democratic and centralized systems in terms of governance concepts, policy design, and implementation efficiency. Through the comparative analysis of the management practices of typical countries, the impact of institutional differences on the management of new quality productivity is discussed, so as to provide reference for international experience exchange.

1.3. Research Implications

1.3.1. Theoretical Implications

From the perspective of comparative politics, this paper explores the interaction between the management of new productive forces and the political system. By constructing a relevant theoretical framework, this paper enriches the research content in the intersection of comparative politics and economic management, and provides new ideas for the development of public management theory in the era of digital economy.

1.3.2. Practical Implications

The purpose of this paper is to provide practical enlightenment for international policy design, especially in the context of globalization and accelerated technological development, how to maximize the social value of new quality productivity through policy tools, and promote the harmonious development of technology and society. The conclusions of this paper can provide a reference for the formulation of an adaptable policy framework, and at the same time promote international cooperation in the field of new quality productivity management.

1.4. Research Methodology

The following research methods are used in this paper:

1.4.1. Literature Review

By systematically combing the relevant literature on new quality productivity, digital economy and comparative politics at home and abroad, this paper provides a theoretical basis and research background for the research.

1.4.2. Case Comparison and Analysis

Typical countries (such as the United States, Germany, China, and Singapore) are selected as the research objects, and the characteristics and advantages of different political systems in governance models are revealed through comparative analysis of their new productivity management practices.

Figure1 is a proposed chart of the trend of the global digital economy development, showing the changes in the size of the global digital economy from 2000 to 2025 (forecast). The chart below illustrates the growth trend of the global digital economy from 2000 to 2025. The figure clearly shows that the digital economy is showing a rapid growth trend, especially after 2015, the growth rate has accelerated significantly. This growth reflects the important driving role of new quality productivity in the era of digital economy, and provides intuitive data support for the research background of this paper.

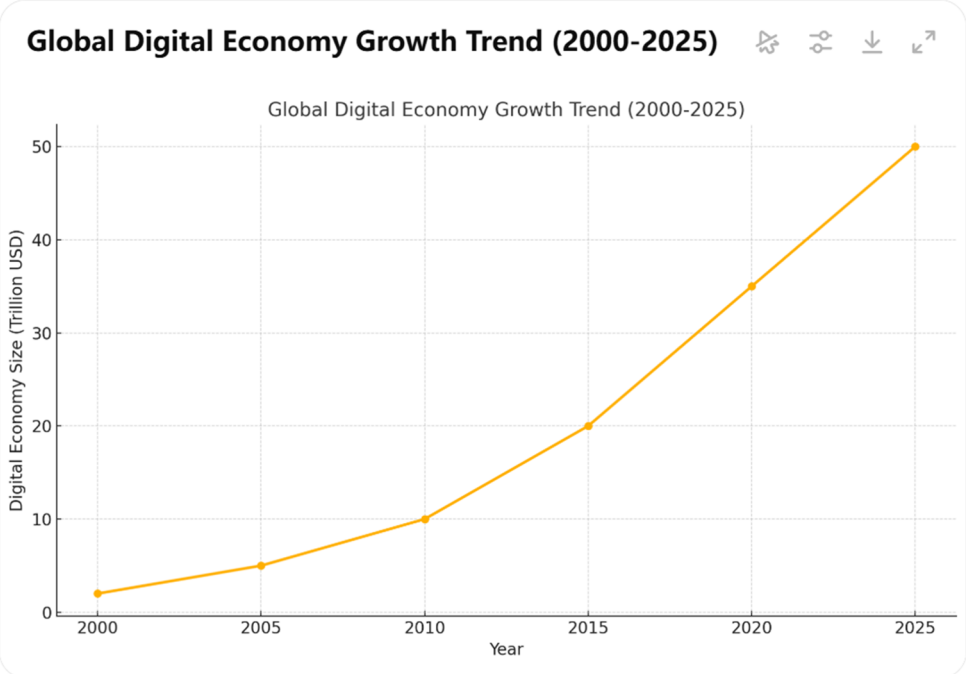

Figure 1. global digital economy growth trend (2000-2025)

2. The Connotation of New Quality Productivity and the Background of Digital Economy

2.1. Definition and Composition of New Quality Productivity

2.1.1. Definitions

In the era of digital economy, new quality productivity refers to the form of productivity achieved through data-driven, intelligent decision-making and collaborative innovation by relying on emerging technologies such as artificial intelligence (AI), big data, and cloud computing in the era of digital economy. Compared with traditional productivity, new productivity emphasizes the core role of technology, the efficient operation of the coordination mechanism and the contribution of knowledge workers, which is an important pillar of the development of the digital economy.

2.1.2. Constituent Elements

(1) Technology-driven: artificial intelligence, big data, cloud computing. Technology is the cornerstone of new quality productivity. Technologies such as artificial intelligence, big data, and cloud computing have given the production process the ability to be intelligent and automated: Artificial Intelligence (AI): Algorithmic optimization enables automated forecasting, real-time decision-making, and resource allocation, significantly improving productivity. Big data: The collection, storage, and analysis of massive amounts of data provide insights into the production process, enabling precise service and dynamic adjustments. Cloud computing: Provides flexible computing and storage capabilities to support efficient collaboration across regions and departments.

(2) Collaborative governance: collaboration between the public and private sectors. In the context of the digital economy, the new quality of productivity emphasizes the in-depth cooperation between multiple subjects. The public and private sectors work together to improve economic efficiency and solve social problems through resource integration, technology sharing and joint innovation. For example, in the construction of smart cities, the government provides policy support, and enterprises are responsible for technology research and development and implementation, and the two parties work together to achieve optimal allocation of resources.

(3) Talent-driven: the importance of knowledge workers. Unlike traditional productivity, which relies on manual labor, the core of new productivity is knowledge-based labor. These workers drive innovation through creative thinking and technical skills. Especially in the field of artificial intelligence and big data, high-end technical talents play a decisive role in the formation and growth of new quality productivity.

2.2. The Relationship Between the Digital Economy and New Quality Productivity

2.2.1. The Transformation Path from Traditional Productivity to New Quality Productivity

Traditional productive forces mainly rely on the three major elements of land, capital and labor, and pursue large-scale and standardized production models. However, with the rapid development of digital technology, productivity is gradually shifting to intelligence and personalization. The formation of new quality productivity has gone through the following stages:

(1)Mechanization: From manual labor to machine production, the initial improvement of labor efficiency has been realized.

(2)Automation: The production mode represented by industrial robots and assembly lines has improved the large-scale production capacity.

(3)Intelligent: Relying on AI and big data, it realizes dynamic optimization and intelligent decision-making of the whole production process.

This transformation is not only reflected in the progress of the means of production, but also involves a fundamental change in the form of production organization and the mode of resource allocation.

2.2.2. The Economic Value of Data as a Factor of Production

Figure 2. comparison of traditional and new-quality productivity

In the new quality of productivity, data is regarded as a core factor of production as important as land, labor, and capital. Its economic value is mainly reflected in the following aspects:

(1)Resource optimization: Through big data analysis, we can accurately identify the efficiency bottlenecks of resource allocation and maximize resource utilization.

(2)Value creation: Data-driven business models (e.g., personalized recommendations, precision marketing) have become an important source of competitiveness for modern enterprises.

(3)Risk prediction: The combination of big data and AI can effectively predict market trends and potential risks, and help enterprises and governments formulate scientific response strategies.

The chart below shows the comparison of traditional productivity with new quality productivity in five key dimensions, including drivers, resource types, collaboration models, output characteristics, and core tools. It can be intuitively seen that the new quality productivity has significant advantages in collaboration ability and intelligent output, while the traditional productivity emphasizes more material resources and basic tools. This diagram helps to understand the essential difference between the two types of productivity.

3. New Qualitative Productivity Management from the Perspective of Comparative Politics

3.1. Theoretical Framework

3.1.1. The Relationship between Political Institutions and Management Models

The effective management of the new productive forces depends to a large extent on the political system. The political system determines how resources are allocated, the efficiency of policy implementation, and the participation of social forces. In a democratic system, the management model is usually more market-driven and socially collaborative, and the policy-making process is transparent and participatory. Under the centralized system, the government's role in policy formulation and resource allocation is more critical, emphasizing the unity of national will and the efficiency of strategy implementation.

3.1.2. Characteristics of Democratic and Authoritarian Systems in the Application of Digital Technology

(1)Democratic system: tends to promote market competition and technological innovation, and guides the participation of enterprises and social forces through policies. The focus of regulation is to ensure data transparency, privacy and security, and to avoid the misuse of technology.

(2)Centralized system: Rapid technology adoption and diffusion through centralized policy design and resource allocation. As the main promoter of technology application, the government can concentrate on breaking through technological bottlenecks and achieving large-scale application.

3.2. Case Studies: Practices in Different Countries

3.2.1. Democratic Institutions: The United States, Germany

(1) United States. Market-driven and data-transparent: The U.S. relies heavily on market forces to drive technological development. Innovation centers such as Silicon Valley optimize resource allocation through market mechanisms, and the AI and big data industries are developing rapidly. Data transparency and privacy security legislation, such as the California Consumer Privacy Act, ensures a balance between user rights and market innovation.

The role of the government: The U.S. government acts more as a regulator, providing a guiding framework for data use and technological development, rather than directly intervening in the development of the industry.

(2)Germany. Technological innovation and privacy protection: Germany emphasizes the combination of technology and social welfare, promotes the Industry 4.0 strategy, and widely applies AI and big data technologies in the manufacturing sector. At the same time, Germany's strict privacy laws, such as the General Data Protection Regulation, limit the misuse of technology.

The role of the government: The government pays attention to the cooperation with society and enterprises when promoting the application of technology, and ensures fair competition and ethical use of technology through legislation and policies.

3.2.2. Centralized System: China, Singapore

(1) China. State-led and strategic planning: China is vigorously promoting the development of AI, big data, and cloud computing, guided by policies such as the New Generation AI Development Plan. The government provides financial support and policy incentives to create a favorable environment for the development of the technology industry.

Centralized technology management: The state-led data resource integration capability is strong, such as cross-industry data sharing and resource optimization through the national platform.

(2) Singapore. Centralized governance: Singapore uses the Smart Nation Initiative as a framework to promote the use of digital technologies in urban management, healthcare, and transportation through a government-led approach.

Efficient public services: The government has improved the efficiency of social governance through precise data governance and policy implementation. For example, intelligent transportation systems enable real-time monitoring and dynamic resource scheduling.

3.3. Comparative Analysis

3.3.1. Management Efficiency vs Data Privacy

(1)Democracies tend to ensure data privacy, but the policy-making process is complex, which can affect the efficiency of rapid adoption of technology.

(2)The centralized system is characterized by centralized governance, which has significant advantages in technology popularization and resource integration, but the protection of data privacy may be insufficient.

3.3.2. Innovation Environment vs Policy Stability

(1) The open market environment under the democratic system provides a good soil for technological innovation, but

the results of innovation may be affected by policy changes or public opinion.

(2)A stable policy environment in a centralized system facilitates long-term technology planning, but excessive centralization may inhibit private innovation.

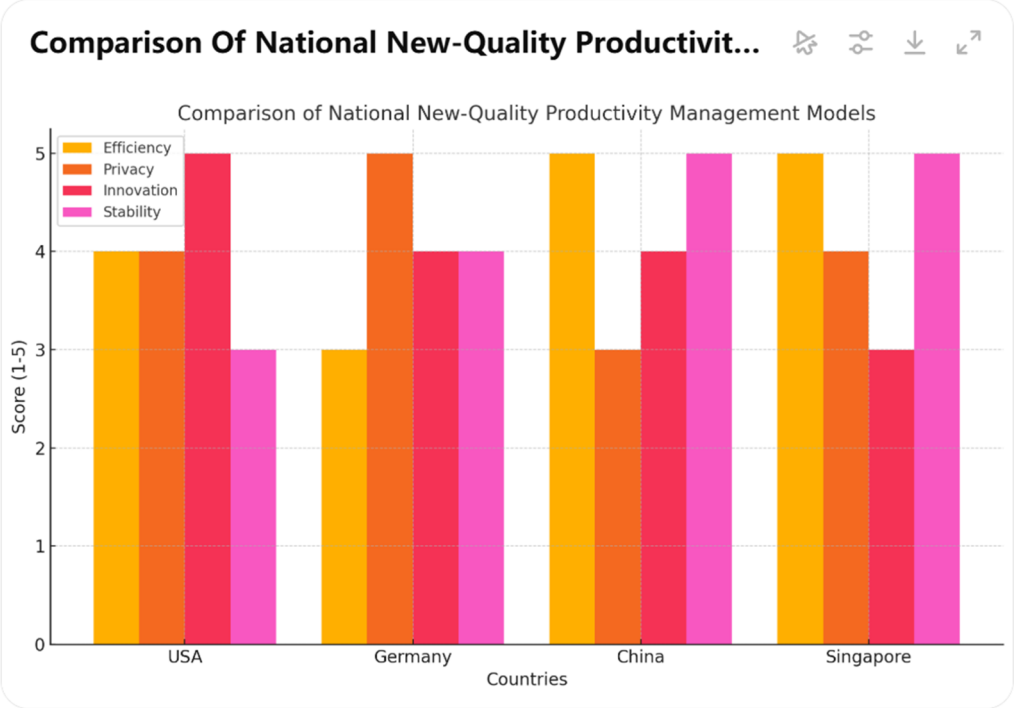

Figure 3. comparison of national new-quality productivity

The chart above shows the scores of the United States, Germany, China, and Singapore in four dimensions: management efficiency, data privacy, innovation environment, and policy stability. As you can see in the diagram:

(1)China and Singapore have significant advantages in terms of management efficiency and policy stability.

(2)The U.S. and Germany excel in data privacy and innovation environments.

4. Challenges of New Quality Productivity Management in the Era of Digital Economy

4.1. Technical Challenges

4.1.1. Data Governance and Privacy Protection

In the context of the digital economy, the collection, storage, processing and use of data, as a core factor of production, is facing tremendous governance pressure.

(1) The contradiction between data ownership and privacy protection: The commercial use of personal data brings huge benefits to enterprises, but unauthorized data use may infringe on personal privacy and lead to the loss of social trust.

(2) Cross-border data flow: Due to the significant differences in data protection laws of various countries, cross-border data flow faces dual challenges in the application of technology, both legality and security.

4.1.2. Technical Ethics

With the wide application of artificial intelligence, big data and other technologies, ethical issues are gradually emerging:

(1) Algorithmic bias: Due to problems in dataset or algorithm design, AI may reflect social bias in decision-making, resulting in unfair results.

(2) Technology abuse: For example, facial recognition technology may be used for mass surveillance, infringing on individual freedom and privacy.

4.2. Policy Challenges

4.2.1. Conflicts of Interest in Cross-Border Collaboration

In the context of the globalization of the digital economy, there are obvious differences in the interests of different countries in the management of new quality productivity:

(1) Divergence of technical standards: The lack of consensus among different countries on technical standards and data security protocols has increased the difficulty of global collaboration.

(2) National competition: New quality productivity has become an important area of economic competition between countries, and the competition for technology output and market control may lead to conflicts of interest.

4.2.2. The Problem of New Technology Adapting to the Law Lagging

The rapid development of new technologies often exceeds the adaptability of the legal system:

(1) Legal gaps: For example, the application of artificial intelligence in medical care, autonomous driving and other fields may face a regulatory vacuum.

(2) Lag in legislation: Traditional laws have a long adjustment cycle, and it is difficult to adapt to the rapid changes in technological development, thus hindering technological innovation.

4.3. Social Challenges

4.3.1. The Digital Divide and Increasing Social Inequality

The spread of digital technology is not evenly distributed across all regions or populations, creating a "digital divide":

(1) Regional differences: Developed regions have advantages in terms of technological resources and applications, while backward regions may not be able to enjoy the dividends brought by the digital economy.

(2) Social stratification: The lack of digital skills is likely to further widen the income gap between high-skilled and low-skilled workers.

4.3.2. The Impact of AI on Employment

The popularity of artificial intelligence has gradually replaced traditional jobs:

(1) Reduction of low-skilled jobs: The application of automation in manufacturing and service industries has led to the loss of a large number of jobs.

(2) Employment structure adjustment: Although new technologies create new occupations, job matching requires workers to have corresponding skills, which may increase social instability.

The figure below shows the Ishikawa Diagram of the challenges of new productivity management, which summarizes the main issues from three levels: technology, policy, and society. These include:

(1)Technical challenges: data governance and privacy protection, technical ethics issues.

(2)Policy challenges: conflicts of interest in cross-border collaboration, legal lag in adaptation of new technologies.

(3)Social challenges: the digital divide and the rise of social inequality, and the impact of artificial intelligence on employment.

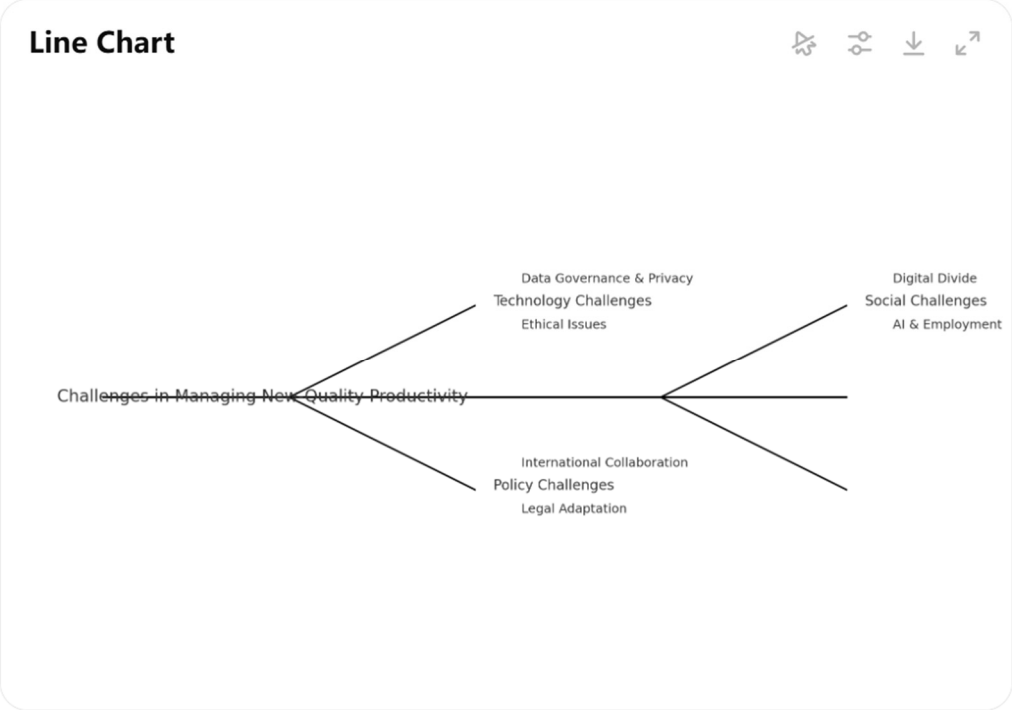

Figure 4. line chart

5. Policy Implications for New Quality Productivity Management

5.1. Draw Lessons from Comparative Politics

5.1.1. Complementarity between Democratic and Centralized Management Models

The democratic and centralized political systems show their respective advantages and disadvantages in the management of new productive forces:

(1) Democratic management model: market-driven, focusing on data transparency and technological innovation. This model can stimulate social vitality, but there may be shortcomings in coordination efficiency and resource integration.

(2) Centralized management model: with the state as the core, emphasizing the efficiency of strategic planning and policy implementation. This model has obvious advantages in concentrating resources and breaking through technical bottlenecks, but it may face the problems of insufficient innovation drive and privacy protection.

The complementarity of the two provides important reference significance:

Promote innovation through democracy: give full play to the role of market mechanisms and social forces to stimulate the vitality of technological innovation.

Centralization to ensure efficiency: through national strategic planning and resource integration, to ensure the rapid matching of technological development and social needs.

5.1.2. The Need for Global Collaborative Governance

In the era of digital economy, the management of new quality productivity has transcended national boundaries and presented global characteristics:

(1) Technology interconnection: Cross-border data flow and technology standardization require international collaboration.

(2) Coordination of interests: In the field of digital economy, countries are facing the problem of unequal resource allocation and technological income distribution, and global collaborative governance is urgently needed to achieve a win-win situation for all parties.

Therefore, building a collaborative framework based on international consensus is essential to improve the global benefits of new quality productivity management.

5.2. Policy Recommendations

5.2.1. Establish a Framework for International Digital Economy Cooperation

(1) Unified standards: Formulate internationally accepted data security, privacy protection and technical standards to reduce institutional barriers in cross-border collaboration.

(2) Coordination mechanism: Promote cooperation between international organizations and regional platforms (such as the G20 and the Belt and Road) in the field of digital economy governance, and enhance policy coordination among countries.

(3) Cross-border data governance: Realize the free flow and safe use of cross-border data through international agreements, and provide a basic guarantee for global technical collaboration.

5.2.2. Promote Collaborative Governance between the Government, Enterprises and Society

(1) Multi-subject collaboration: encourage the government, enterprises and social organizations to participate in decision-making and implementation in the management of new productive forces.

(2) Data sharing platform: Establish a data sharing mechanism between the public and private sectors to achieve optimal allocation of resources and maximize efficiency.

(3) Implementation of social responsibility: through policy incentives, promote enterprises to assume social responsibility for technological development, and promote technology to benefit the whole society.

5.2.3. Optimize the Balance Mechanism between New Quality Productivity and Social Equity

(1) Digital inclusion: Promote the popularization of technology in different regions and social groups, and reduce the inequality caused by the digital divide.

(2) Employment transformation support: In response to the impact of artificial intelligence on traditional employment, special funds and education and training programs have been set up to help workers adapt to the new technological environment.

(3) Technical ethics supervision: Establish a technical ethics evaluation mechanism to ensure that the application of new quality productivity is in line with the principles of fairness, transparency and sustainable development.

The below is a color pie chart of the new quality productivity management policy recommendations, showing the proportion of each policy level:

(1)Foundational Systems: 40%, emphasizing the importance of global collaboration and standardization.

(2)Technological Implementation: 35%, focusing on the construction of data sharing platforms and technical ethics supervision.

(3)Social Benefits: 25%, with a focus on social equity and employment support.

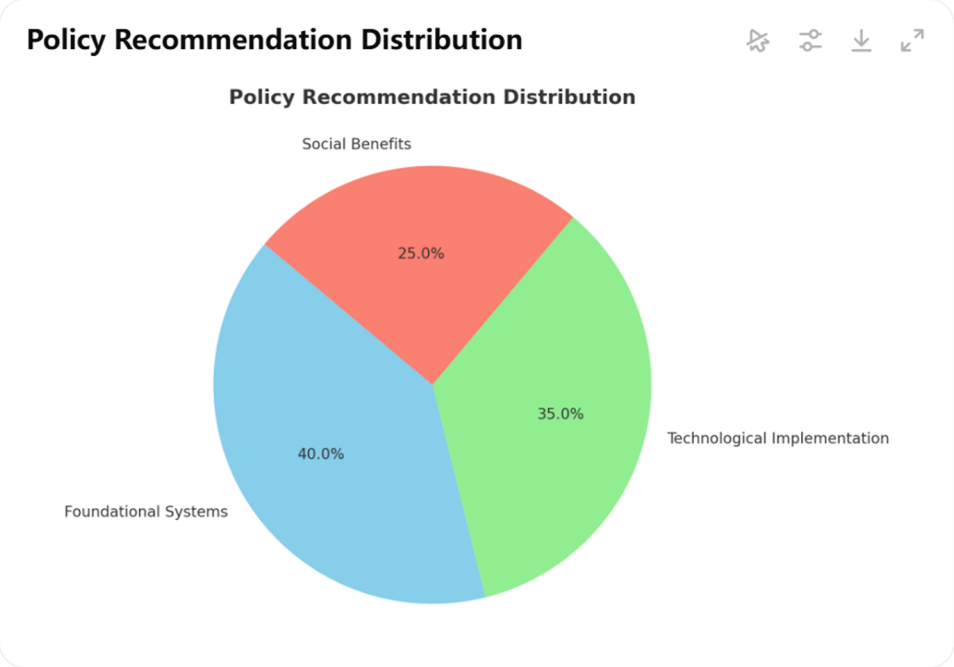

Figure 5. policy recommendation distribution

6. Conclusion and Prospects

6.1. Main Conclusion

6.1.1. Different Political Systems have Their Own Advantages in the Management of New Quality Productive Forces

The research of this paper shows that democratic and centralized political systems have their own advantages in the management of new quality productive forces:

(1) Democratic system: pay attention to market-driven and technological innovation, can fully mobilize enterprises and social forces to participate in technology development and application, and create a good innovation environment. However, its governance efficiency may be affected by multi-party coordination and interest play.

(2) Centralized system: Dominated by national strategic planning, policy implementation efficiency is high, and resources can be quickly concentrated to solve key technical bottlenecks. However, its innovation dynamism may be constrained by its over-reliance on national leadership.

These differences not only reflect the characteristics of different systems in terms of technological development, but also provide a useful reference for the policy choices of countries in the context of the digital economy.

6.1.2. The Era of Digital Economy Calls for a More Inclusive and Coordinated Global Governance System

With the global application of digital technology, the management of new quality productivity is no longer

confined to a single country, and cross-border collaboration and coordination of interests have become particularly important:

(1) Global technology collaboration: The establishment of unified technical standards and transnational data governance frameworks will help resolve cross-border contradictions in technology applications.

(2) Multilateral governance mechanisms: Strengthen the role of international organizations, promote inclusive and sustainable global governance models, and lay the foundation for all countries to share the dividends of the digital economy.

This kind of global coordinated governance system can not only balance the interests of different countries, but also provide greater support and guarantee for the development of new quality productive forces.

6.2. Research Limitations

6.2.1. Limited Case Coverage

This paper is mainly based on the typical cases of the United States, Germany, China, and Singapore, although these countries are well represented, they still cannot comprehensively cover the practices of all countries, especially the unique experiences and challenges of developing countries in the management of new quality productivity have not been included.

6.2.2. Unpredictability of Future Technological Developments

The development of new quality productivity is highly dependent on technological breakthroughs, and the rapid and complex nature of technological change makes it difficult for research to comprehensively predict new trends or problems that may arise in the future. Current conclusions may need to be adjusted as the technology evolves further.

6.3. Future Research Directions

6.3.1. Further Research on the Ethics and Social Adaptation of Technology

In the future, there is a need for more in-depth exploration of the impact of technology ethics on the management of new qualitative productivity:

(1) Algorithmic fairness: study how to design more inclusive and transparent algorithms to avoid the perpetuation of social bias.

(2) The impact of technology on social structure: explore how new quality productivity affects social equity, employment patterns, and labor market adjustment.

6.3.2. Evolution and Impact of International Governance Models

With the acceleration of globalization, international governance in the field of digital economy will become an important issue:

(1) Feasibility of international cooperation: study how to build an efficient international cooperation mechanism in a complex interest pattern.

(2) Coordination of regional and global governance: Analyze the role and influence of regional organizations (such as the European Union and APEC) in the global governance framework.

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