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Challenges and Opportunities for Digital Economy Metrics

Chaoheng Yan

Belarusian National Technical University, Faculty of Marketing, Management, and Entrepreneur- ship (FMME), Minsk, Belarus.
ORCID: https://orcid.org/0009-0001-1811-6381.
Email: emoting.cz@gmail.com

ABSTRACT

Digital economy is profoundly changing the traditional economic form and business model, and becoming a new engine leading global economic growth. However, due to the unique attributes of digital economy, such as virtuality, ubiquity, high speed and cross-border, it brings many challenges to the existing statistical accounting system. This paper firstly analyses the impact of digital economy on the traditional GDP accounting system, and discusses the main problems faced by the digital economy accounting, including the vague definition of the object and scope of accounting, the inconsistency of statistical caliber and standards, and the difficulty of obtaining basic data. Secondly, this paper puts forward countermeasures and suggestions to promote the statistical accounting of digital economy from the aspects of improving the accounting theory, innovating the accounting method, reforming the statistical system and strengthening international cooperation. In addition, this paper also discusses the application prospects of emerging technologies such as big data and artificial intelligence in the measurement of digital economy, as well as the significance of digital economic accounting for the theoretical innovation and practical development of economic statistics. In the era of digital economy, accurate measurement of the scale, structure and effect of digital economy is of great value for grasping the development trend of the new economy, formulating industrial policies and promoting economic transformation and upgrading. Looking to the future, it is urgent to accelerate the construction of a scientific, standardized and internationally coordinated statistical index system for digital economy, so as to provide powerful statistical support and decision-making reference for the high-quality development of digital economy.

Keywords:

Digital economy measurement; statistical accounting innovation; big data application; economic statistics theory.

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1. Introduction

Digital economy is a new economic form emerging along with the rapid development and wide application of information technology [1]. It is mainly characterized by digitalization, networking and intelligence, and is becoming an important force leading global economic growth [2]. Digital economy not only changes the traditional production methods and business models, but also poses a serious challenge to the existing economic theory system and statistical accounting system.

The traditional national economic accounting system mainly focuses on real economic activities, and it is difficult to comprehensively reflect the development status and trend of digital economy. The digital economy has unique attributes such as virtuality, ubiquity, high speed and cross-border, and many digital economic activities are difficult to be measured by traditional GDP indicators. For example, the free services provided by Internet enterprises, cross-border flow of digital products, and the value contribution of data elements cannot be fully incorporated into the existing accounting framework. This has resulted in traditional macroeconomic indicators such as GDP underestimating the true scale and impact of the digital economy.

To accurately measure the digital economy, it is necessary to improve the theory and methodology of economic statistics with the times. On the one hand, it is necessary to re-examine the connotation of economic growth in the digital era and explore the inclusion of digital capital and data elements in the production function and accounting system [3]. On the other hand, it is necessary to innovate data collection and processing methods, make full use of big data, artificial intelligence and other emerging technologies [4], and improve the timeliness, comprehensiveness and accuracy of digital economic statistics. At the same time, it is also necessary to strengthen international cooperation and build internationally comparable and dynamically updated accounting standards for the digital economy.

2. Historical Opportunities for Economic Statistics in the New Era

2.1 Economic Statistics and Contemporary National Situation Studies: Theoretical Cornerstones to Support National Situation Studies

Economic statistics is inextricably linked to the study of national situations. National situation research is a process of comprehensive assessment and strategic analysis of a country's comprehensive national strength, development level and international status [5]. As the core element of national comprehensive national strength, economic strength cannot be measured and evaluated without the support of economic statistics. Only by accurately grasping the macroeconomic operating situation, scientifically assessing the degree of optimization of industrial structure, and deeply analyzing the space for total factor productivity [6], can we make objective and rational judgement of the national situation.

The traditional national situation study mainly focuses on military, political and other hard power, while the modern national situation study pays more attention to economic,

scientific and technological, cultural and other soft power. This requires economic statistics to keep pace with the times, expand research horizons, innovate theoretical methods, and provide a solid theoretical foundation and data support for the study and judgement of the national situation. On the one hand, it is necessary to improve the national economic accounting system, and incorporate new economic patterns such as digital economy and green development into the scope of accounting, so as to truly reflect the overall picture of economic and social development. On the other hand, it is necessary to develop input-output analysis, growth accounting and other methods, strengthen supply-side and demand-side statistics, and provide decision-making references for macroeconomic control and industrial policy optimization.

In the era of globalization, national comparisons should be made not only on a national basis, but also on a global basis. This puts higher demands on the comparability and interpretability of economic statistics. How to assess the economic volume of each country? How to judge industrial competitiveness? How to measure the driving force of innovation? All these require the construction of internationally comparable indicator systems and measurement models. Economic statistics should take the initiative to benchmark against internationally accepted rules, actively participate in global statistical governance, and promote the formation of widely recognized economic accounting standards. At the same time, it is necessary to adhere to the principle of 'we are the master', based on the national situation and public opinion, and tell a good Chinese story and disseminate the Chinese voice in foreign statistics.

The development of contemporary theories on national situation has also brought new topics and ideas to the study of economic statistics. For example, how to measure the level of economic globalization? How to evaluate the maturity of national innovation ecosystem? How to examine the degree of common prosperity? The exploration of these questions helps to enrich and innovate the research content and analytical framework of economic statistics. In turn, the advancement of economic statistics theory and methodology can provide more scientific and rigorous 'quantitative tools' for the study of modern national situation. It is thus clear that economic statistics and the theory of national situation are mutually reinforcing and synergistically developing. In the historical process of building a new development pattern, the two should work hand in hand to serve the overall situation of national development.

2.2 Big Data and Artificial Intelligence: Dual Engines Driving Economic Measurement Innovation

The rise of big data and artificial intelligence technology is subverting the traditional economic and social operation mode and profoundly changing the content, mode and utility of economic measurement. The emergence of massive heterogeneous data has brought out the full picture and details of economic and social activities. The development of machine learning algorithms has greatly improved the ability of data processing and knowledge mining. Under the wave of technological change, economic statistics has ushered in a brand-new opportunity for development.

First, big data has expanded the breadth and depth of economic measurement. Traditional statistics mainly rely on sample survey data, there are limitations such as limited sample size, lack of timeliness and insufficient granularity [7]. Big data, on the other hand, has a wide range of sources, real-time online, multi-dimensional granularity, and is able to portray the panorama of economic operation from different perspectives. In particular, new data sources such as Internet platforms and Internet of Things sensors provide powerful support for observing new business models. Through the mining of e-commerce online shopping, shared bicycle, online payment and other behavioral data [8], you can capture high-frequency consumption, employment, logistics and other economic pulse. Big data allows many economic activities that were originally difficult to quantify to 'surface', greatly expanding the statistical boundary. At the same time, the correlation analysis of multi-source data also helps to portray the inner mechanism of the economy and society, and enhance the explanatory power of economic measurement.

Second, artificial intelligence empowers the intelligent transformation of economic measurement. The processing and analysis of massive data has exceeded the limit of human resources, and artificial intelligence is urgently needed to drive the re-engineering of statistical production processes. Machine learning can automatically identify abnormal data, intelligently verify data quality, and greatly improve the efficiency of statistical data processing. Knowledge mapping, deep learning and other technologies can dig out the correlation law behind the data and stimulate the value of the data. In addition, advances in artificial intelligence technologies such as natural language processing and voice recognition have made unstructured data such as corporate financial reports, user comments, audio and video become the new 'raw materials' for economic measurement, further broadening the source of statistical data. Artificial intelligence has reshaped the whole process of statistical production, promoting economic statistics from 'manual workshop' to 'intelligent factory'.

With the power of big data and artificial intelligence, economic statistics, on the one hand, should innovate the data collection method, establish a full coverage, multi-frequency, easy-to-access data system. On the other hand, it is necessary to develop intelligent algorithmic models to improve the efficiency of data analysis, processing and mining. It is necessary to strengthen the synergistic integration of statistical big data, algorithmic models and business knowledge to create a composite statistical talent team. To improve the data sharing and opening mechanism, strengthen data cooperation with Internet platforms, financial institutions and other market players. It is necessary to improve data security and personal privacy protection system to enhance public trust in data collection and application. Big data and artificial intelligence are the 'twin engines' driving the modernization of economic statistics, which will certainly promote economic measurement from 'empirical judgement' to 'data talk', and create a new situation for the development of economic statistics.

2.3 Indicator improvement and domain innovation: towards more explanatory economic measurement

The continuous development and change of the economy and society has put forward new and higher requirements for economic measurement. The traditional GDP accounting, input and output and a series of economic indicators and analysis methods [9], although time-honored, but it is difficult to fully adapt to the new trend of digital and green development. Innovation and improvement of economic statistics indicator system and accounting field, build 'GDP +' multiple evaluation system [10], is the important mission of economic statistics in the new era.

First of all, we should accelerate the digital economy accounting. The digital economy is an important force leading the new round of technological revolution and industrial change, and its statistical monitoring is a general trend. Major economies have layout digital economy accounting [11], seize the right to statistical discourse. China should accelerate the construction of the digital economy statistical index system, improve the digital industry, digital products, digital elements and other classification standards, and explore the preparation of the digital economy accounting account. We should innovate the statistical survey system of digital economy, and improve the standardization and synergy of data collection on the Internet platform. It is necessary to strengthen the application of big data, cloud computing and other digital technologies in economic statistics, and improve the timeliness and intelligence of digital economy statistics.

Secondly, green GDP accounting should be improved. Harmonious coexistence of man and nature has become a universal consensus for the development of modern civilization. Green GDP accounting is an attempt to include resource consumption, ecological degradation, environmental pollution and other negative externalities in economic accounting, and more comprehensively assess the 'green content' of economic growth. It is necessary to speed up the establishment of resource and environmental accounting accounts, quantify the stock of natural resources, the value of ecosystem services and other indicators, so as to provide data support for the construction of ecological civilization. It is necessary to innovate pollutant emission accounting methods, improve the carbon emission statistical system, and serve the realization of the 'double-carbon' goal. Research on green national economic accounting should be carried out, and natural capital accounting and ecological product value accounting should be explored to provide benchmarks for high-quality development.

Once again, it is necessary to vigorously develop the economic measurement of well-being. Focusing on improving people's livelihoods and enhancing people's well-being is the starting and ending point of economic development. It is difficult for traditional GDP indicators to fully reflect people's livelihood and quality of life. After the emergence of happiness economics, subjective happiness measurement has received increasing attention. International organizations such as the United Nations and the OECD have released happiness indices one after another, leading the reform of global well-being measurement.

China should combine with socialist core values to build an evaluation index system reflecting Chinese people's concept of happiness. We should innovate the subjective well-being measurement method combining big data collection and questionnaire surveys to dynamically monitor residents' sense of well-being. Interdisciplinary research should be strengthened to analyses the mechanism of factors affecting the sense of happiness from economic, social, cultural and psychological perspectives.

The expansion of the field of economic statistics and the improvement of indicators should ultimately be directed to the revelation of the laws of economic development and the needs of macro-control. On the one hand, multiple indicators can help to observe economic operation from different perspectives, objectively assess the performance of economic development, and anticipate risks and hidden dangers. On the other hand, the rich indicators need to be organically unified in the logical framework, such as the national economic accounting matrix and the social accounting matrix, so as to better reveal the inner mechanism of economic operation. The innovation of indicators and the re-engineering of the accounting system will greatly enhance the foresight, predictability and relevance of economic statistics to the macroeconomic situation, promote economic statistics from ‘descriptive’ to ‘explanatory’, and better serve the modernization of the national governance system and governance capacity.

3. Challenges Facing Economic Measurement and Economic Statistics

3.1 Bottlenecks in the development of economic statistics and the plight of talents

In recent years, although big data, artificial intelligence and other emerging technologies for the modernization of economic statistics injected new momentum, but undeniably, the development of China's economic statistics discipline is still faced with a number of bottlenecks constraints and the reality of the dilemma [12]. On the one hand, economic statistics theory innovation is insufficient, the accounting system is rigid and lagging behind, it is difficult to adapt to the digital economy, green development and other new modes of measurement needs. On the other hand, the overall status and influence of the discipline of economic statistics is declining, and it is becoming marginalized in the economics discipline system, making it difficult to attract and cultivate high-level innovative talents.

Insufficient innovation in theory and methodology is a deep-seated obstacle to the development of economic statistics. The traditional national economic accounting system is mainly based on the industrialization era and oriented to the real economy, while the measurement of the digital economy, platform economy and other new economic forms is still very imperfect. Many digital transactions and services are not included in the calculation of GDP and other core indicators. Even in traditional input-output accounting and other areas, theoretical models and basic data need to be updated. A single accounting method and different statistical calibers have called into question the authority and credibility of macroeconomic data.

The discipline of economic statistics does not have a strong capacity for independent innovation, and cooperation with international exchanges is still limited. There is not much research on major theoretical issues, and there is a lack of original contributions in the global statistical academic discourse [13]. Compared with the booming development of mathematical statistics and econometrics, the construction and innovation of the theoretical system of economic statistics are obviously lagging behind. The formulation of international statistical rules and standards is mainly dominated by developed countries, and it is often difficult to fully reflect the interests of large developing countries. Although China is the second largest economy in the world, its voice in the global governance of economic statistics is still seriously inadequate.

The poor quality and weak reserve force of economic statistics personnel training has become a key bottleneck restricting the sustainable development of the discipline. Over the years, the positioning of economic statistics programmers in universities has been unclear, the objectives of talent training are out of line with the needs of the society, the teaching content is outdated, and the practical ability is lacking. The contact between academia and industry is not close enough, and the mechanism of collaborative education for the integration of industry and education, science and education has not yet been established. Many colleges and universities are facing the plight of a shortage of teachers and a serious loss of students in the specialty of economic statistics. The backbones of the statistical departments are aging in knowledge and lacking in innovation consciousness and ability. The entire economic statistics talent team is weak, and the professional quality is difficult to adapt to the new era, new environment and new requirements.

To break the deadlock in the development of economic statistics, it is necessary to make an integrated effort in theory, talent and platform, and take multiple measures. At the theoretical level, we should focus on major theoretical and practical issues such as digital economic statistics and green GDP accounting, and increase original and subversive innovations. We should take the initiative to set up topics to lead the global economic statistics academic thinking and methodological innovation. At the talent level, it is necessary to deepen the reform of postgraduate education of professional degree in economic statistics, and strengthen the cultivation of complex and application-oriented high-level talents. It is also necessary to establish a flexible and open mechanism for the introduction of talents and to recruit talents from home and abroad. At the platform level, it is necessary to integrate the innovative resources of universities, research institutes and statistical departments, build a number of bases for theoretical and applied research on economic statistics, and create a high-level think tank.

3.2 Lagging innovation in economic statistics in the context of big data

The advent of the big data era has injected new vitality and vigor into traditional economic statistics. Massive, multi-source, heterogeneous big data contains unprecedented social and economic information [14], which is expected to greatly expand the breadth and depth of economic statistics. Traffic flow and energy consumption data collected by IoT

sensors in real time can be used to measure industrial production and urban operation. E-commerce platform sales and logistics data can reflect the development of consumption and circulation. Fintech data such as mobile payment and online lending can portray the coverage and depth of financial inclusion. Big data provides a new source of data for portraying new modes of business and helps to improve the timeliness, accuracy and comprehensiveness of economic operation monitoring.

However, it is undeniable that in the face of the surging tide of big data, the theoretical innovation and practical application of economic statistics are lagging behind. Mainly in the following aspects.

Firstly, the basic statistical data are not sufficient. Horizontally, different departments, different regions of the data barriers, information islands are common, data sharing and open mechanism has not been established [15], affecting the full use of data resources. Vertically, the breadth and depth of statistical data collection is insufficient, the ability to obtain data on platform economy, sharing economy and other new modes of new business is weak, and the shortage of full-sample data is prominent. The data collection method is single, dominated by government statistical surveys, and lacks multiple synergies with Internet platforms and social third-party organizations.

Secondly, the updating of statistical technology is not timely. Traditional sample surveys and censuses are inefficient and difficult to adapt to the requirements of big data analysis and processing. Unstructured data storage, cleaning, integration and other lack of standardized processes and tools, data quality control needs to be strengthened. The application of cloud computing, artificial intelligence and other emerging technologies in the field of statistics is insufficient, and the ability of data mining, analysis and visualization is relatively weak. Intelligent transformation of statistical production process has just begun, and there is an obvious gap between the level of statistical informatization and modernization and that of developed countries.

Thirdly, the construction of statistical systems and norms is lagging behind. There is a lack of sound laws and regulations to protect big data statistics, and there are no clear provisions on intellectual property rights and privacy protection in the collection and use of data, so data security is facing many hidden dangers. The imperfect standards and norms, incentives and constraint mechanisms for data sharing among departments, government and enterprises have hindered the orderly flow and optimal allocation of data elements. The supply of statistical survey system for digital economy and platform economy is insufficient, and the relevant statistical index system and accounting methods need to be improved.

Fourthly, the reserve of statistical professionals is insufficient. The statistical team's understanding of big data thinking is still not in place, and the awareness and ability of data development and utilization and in-depth analysis are generally lacking. Composite data science talents are in short supply, and there is a lack of ‘full-stack engineers’ who know both statistical business and data analysis. The data literacy training of relevant majors in colleges

and universities is insufficient, and there is a lack of practical teaching resources. Lack of long-term incentive mechanism for the application of big data in statistical departments, and insufficient motivation for the construction of talent teams.

The innovative development of modern economic statistics adapted to the needs of the big data era must be systematically reconstructed and fully empowered in terms of institutional mechanisms, theoretical methods and technical means. It is necessary to improve the legal system of data sharing and opening and privacy protection, explore the establishment of financial compensation and benefit-sharing mechanisms for data collection and use, and fully mobilize the enthusiasm of all parties to participate in the construction of statistical big data. It is necessary to study and formulate unified and standardized statistical standards for new industries and new modes, and accelerate the improvement of the statistical accounting system for the digital economy. It is necessary to innovate the way of big data collection, broaden the multiple data sources such as production and operation of enterprises, Internet platforms and social collection channels. It is necessary to strengthen the in-depth integration of statistics with artificial intelligence, graph computation and other emerging technologies, and establish a new mode of statistical production with the intelligence of the whole process of data. It is necessary to increase the development of artificial intelligence application scenarios for economic statistics, actively promote 'AI+' economic statistics series products, and create a number of big data application demonstration projects for economic operation prediction and early warning, macro-control and decision-making support.

3.3 International cooperation in economic statistics urgently needs new breakthroughs

Economic globalization and digital development require countries to strengthen international cooperation in the field of economic statistics, and to achieve cross-country and cross-regional data sharing and comparative analysis on the basis of a unified and standardized indicator system [16]. It has become a broad consensus of the international statistical community to build an international academic community of economic statistics and promote the integration and innovation of statistical theory, methodology and data standards. In recent years, China and the United Nations, the World Bank and other international organizations have carried out statistical cooperation in many areas, but overall, there is still a certain gap with the western developed countries. This is mainly reflected in the following aspects.

First, the international academic discourse needs to be improved. For a long time, the western developed countries, by virtue of their economic and technological advantages, have occupied a dominant position in the formulation of global economic statistical rules and standards. In contrast, China's participation in foreign statistical work is not deep enough, and its influence on international statistical rules is still limited. The selection of statistical indicators and the definition of statistical caliber are often difficult to fully reflect the characteristics and interests of China's economic and social development. The number of

high-level international academic journal papers is relatively small, and there are not many original contributions to the construction of the global statistical academic discourse system.

Second, the international comparability of statistics is not high. Influenced by the differences in statistical systems and bias in statistical calibers, the international comparability of China's statistical data has yet to be improved. Some of the statistical indicators are not in line with internationally accepted practices in terms of classification standards and calculation methods, thus affecting the interpretability and authority of the data. In some important statistical data released by international organizations, problems such as missing and delayed data have occurred from time to time. This is not conducive to accurately assessing China's achievements in economic and social development, nor is it conducive to enhancing China's influence in global economic governance.

Thirdly, the training of international statistical talents needs to be strengthened. At present, China lacks complex statistical talents who are familiar with international statistical rules and proficient in foreign languages. The level of internationalization of statistical disciplines is generally low, and there are fewer opportunities to study abroad and participate in international academic exchanges [17]. The internationalization level of university faculty is not high, and they lack overseas study and working experience. To a certain extent, this restricts China's participation and initiative in international statistical affairs, and affects the enhancement of statistical governance capacity and academic discourse.

Fourthly, there is insufficient motivation to participate in global statistical governance. Compared with the economic, financial and trade fields, China has not paid enough attention to participation in global statistical governance, and the strength and breadth of statistical diplomacy need to be strengthened. The participation in international cooperation mechanisms, such as statistical data sharing and statistical capacity enhancement, is not proactive and in-depth enough. The scale of foreign statistical assistance is relatively small, and the summary and promotion of statistical development experience is insufficient. There is a lack of systematic top-level design and strategic planning in the formulation of global statistical governance rules and games.

To solve the bottlenecks restricting the international development of economic statistics, it is necessary to integrate the domestic and international situations and plan the modernization of statistics from a global perspective. It is necessary to deeply participate in international statistical co-operation affairs such as the monitoring of the United Nations Sustainable Development Goals and global data security governance, and actively speak out in areas where China has comparative advantages, such as digital economy statistics and poverty reduction statistics, so as to enhance the power of statistical discourse. It is necessary to speed up the construction of theoretical journals on economic statistics with international influence, and provide a platform for academic exchanges among scholars around the world. It is necessary to take the initiative to integrate into the global statistical standard system, strengthen the international comparison and calibration of basic data and statistical system, and continuously improve the quality of data. It is necessary to improve the international

training system of statistical talents, set up majors taught in English in colleges and universities, improve the internationalization level of the teaching staff, and increase the efforts of young scholars to go abroad for further studies. It is necessary to build a high-level international statistical exchange brand, actively host annual international statistical conferences and symposiums, and strengthen multilateral cooperation with international organizations and think tanks in foreign universities. Only by focusing on China and the world and accelerating the modernization of the statistical governance system and governance capacity can we contribute Chinese wisdom and Chinese solutions to the building of a community of human destiny.

4. How to promote the innovative development of economic measurement and economic statistics?

4.1 Compacting the theoretical foundation and deepening the scientific connotation of economic measurement

The theory of economic statistics is a guide and a reference for the practice of economic measurement. Only through continuous innovation and development of economic statistics theory can we provide solid theoretical support and methodological guidance for statistical practice. At present, the new round of scientific and technological revolution and industrial change is in the ascendant, and the digital economy is developing vigorously, which has put forward new challenges to the traditional economic statistics theory. How to respond to the new technology, new industry, new mode of economic measurement from the theoretical height of the new topics, new requirements, is a major proposition that needs to be explored.

To promote the theoretical innovation of economic statistics, it is necessary to base on the basic principles of economics, absorb and draw on the results of mathematics, computer science and other multidisciplinary cutting-edge results to deepen and expand the scientific connotation of economic measurement. We should focus on the accounting theory of traditional macroeconomic indicators such as GDP and CPI, and enrich and develop the accounting framework from the perspectives of supply, demand and distribution. It is also necessary to aim at the frontier areas such as digital economy statistics and green GDP measurement, and build theoretical models that fit the characteristics of the new economy. It is also necessary to improve the basic theory of statistical data governance by focusing on key issues such as data quality and data security. Adhering to the problem-oriented approach, and from the perspective of serving the overall development of the Party and the country, we will focus our efforts on breaking through a number of major theoretical issues that have a bearing on the national economy and people's livelihoods, and highlight the modernization of the country's governance capacity.

The theoretical innovation of economic statistics should reflect the distinctive characteristics of the times. Marxist political economy is the theoretical foundation of socialist political economy with Chinese characteristics, and it is also the underlying logic of the theoretical system of economic statistics. We should be guided by Marxism, based on

China's national conditions, summarize China's practice, develop China's theory, grasp the essential laws of the digital economy, green development and other new forms of new dynamics, and refine the general theory of the development of economic statistics under the conditions of the socialist market economy with Chinese characteristics [18]. We should adhere to the people-centered approach, establish the concept of big statistics, take the people's sense of access and happiness as an important dimension of economic measurement, and study the establishment of a statistical evaluation system and appraisal mechanism that reflects the needs of the people and social justice. We should actively respond to the challenges of artificial intelligence and other emerging technologies to employment, distribution and other traditional economics propositions, prudently assess their economic and social impacts, and provide theoretical basis for the scientific formulation of macro-control policies.

Theoretical innovation should adhere to both basic and applied research. We should not only encourage free exploration and forward-looking and subversive theoretical attempts, but also focus on the hot spots of economic and social development and strengthen applied countermeasure research. It is necessary to build a mechanism for sharing statistical data at the national, local and departmental levels, and improve the level of data development and utilization. It is necessary to give full play to the advantages of big data, innovate data collection and processing technology, and enhance the effectiveness of statistical monitoring. To strengthen the depth of cooperation between industry, academia and research, and promote the transformation of theoretical achievements into statistical practice [19]. To improve the incentive mechanism for scientific and technological innovation, cultivate and grow the economic statistics theory and research team. Only by planting the theoretical foundation and leading the modernization of statistics with the power of thought, can the cause of economic statistics in China achieve innovation and prosperity.

4.2 Broaden research horizons, and realize the orderly combination of mathematics and reasoning.

Modern economic statistics is a cross-discipline with strong application, which not only requires solid theoretical skills in economics, but also the use of mathematics, computers and other methodological tools. Statistics itself originates from mathematics, mathematical logical thinking and modelling ability, from the huge amount of complex data to refine the law, revealing the essence of the tool. At present, the rapid development of modern information technology, such as big data, artificial intelligence, blockchain, etc., has opened up a broad space for the application of statistics. To realize the innovation of economic measurement theory and method, it is necessary to combine it with the progress of mathematical and physical technology, and to broaden the research horizons in keeping the correctness and innovation.

Mathematical methods have been widely used in the theory and practice of economic statistics. Whether it is linear algebra in input-output accounting, probability theory in distribution theory, or statistical inference in sample surveys, all reflect the power of

mathematical logic. Many important economic statistical indicators, such as GDP deflator, OECD leading index, etc., in essence, is a specific form of mathematical function. The use of mathematical models to portray the laws of economic operation is an important feature of modern economic statistics. Looking ahead, China's economic statistics should take mathematics as a wing to achieve theoretical breakthroughs in many fields. For example, the development of statistical analyses of functional data can provide more refined tools for describing the cycle of economic prosperity and the dynamic evolution of income distribution. Using Bayesian statistical theory, we can make probabilistic inference and prediction of economic phenomena from limited a priori information [20]. Carrying out symbolic data analysis can extract the characteristics of economic operation from the textual information of qualitative description, and expand the traditional data form. All these helps to improve the ability of economic statistics to portray uncertainty, dynamics, complexity and other issues.

The use of mathematical methods is not a simple stacking of formulas and concepts, but should be subject to the logic of economic theory and respond to the needs of practical development. At present, the vigorous rise of digital economy has posed new challenges to the traditional economic statistics accounting system. How to accurately measure the scale of the digital economy boundary, how to portray the contribution of data elements to economic growth, there is no mature theoretical framework. In the face of the digital and intelligent development trend, there is an urgent need for economists to cooperate with statisticians, mathematicians and computer experts to form new theories, methods and indicators to measure the development of the digital economy on the basis of solid economic theories and by making full use of the latest mathematical and computational tools. It is necessary to optimize the traditional accounting model from the mathematical point of view, and to construct a new accounting framework from the mechanical point of view for the platform economy, the sharing economy and other new business forms. It is necessary to systematically study the development of the digital economy from a macro perspective and focus on the micro perspective to depict the degree of participation and level of benefit of different groups in the digital economy. This requires extensive absorption of the theoretical results of the digital society and network science, and its creative combination with the analytical methods of economics and management to form a ‘toolbox of wisdom’ that can be used both in the present and in the past.

Mathematical methods are of course important, but we must not put the cart before the horse and deviate from the theoretical essence of economics by overusing sophisticated mathematical tools. Statistical modelling should be based on the laws of the economy, to reveal the intrinsic connection of things as the goal, and to avoid the practice of only seeing mathematical models without seeing the reasoning of economics. Statistical analyses should respect the objective laws of economy and society, always maintain the strength and sobriety, and prevent the use of digital games to mislead the decision-making and confuse the public. To correctly deal with the relationship between mathematical technology and the use of the world, not only cannot understand the mathematics and science, the lack of modern economic

statistics necessary data analysis capabilities, but also can not only understand the mathematics and science, ignoring the significance of the statistical results of the guidance of practice. To strengthen economics, mathematical statistics, computer science and other disciplines of cross-fertilization, in the interdisciplinary thinking in the collision of innovation 'spark'. In short, economic statistics research should adhere to the organic unity of qualitative and quantitative, logic and mathematics, grasp the essence and laws of things at the level of contingency, refine the reality of experience at the level of actuality, and achieve the dialectical combination of 'school' and 'the world' [21], so as to help the economic development of high-quality with a high theoretical character.

4.3 Promoting data application and expanding the AI research paradigm

Economic measurement is a data-intensive work, and the collection, aggregation and analysis of massive data run through it. With the rapid development of the Internet, Internet of Things, cloud computing and other modern information technology, data sources are becoming increasingly rich, the data scale is expanding, bringing a huge impact on the traditional data collection and processing methods [22]. How to find valuable information in a timely manner in the 'flood of data', refining and solidifying it into new statistical production elements, is an important issue for the innovation and development of economic statistics theory and practice. The cross-fertilization of artificial intelligence and statistics provides a new way of thinking to solve this problem.

At present, artificial intelligence is accelerating the penetration into the field of statistics, big data, machine learning, knowledge mapping, blockchain and other new technologies and new methods continue to emerge, greatly expanding the spatial and temporal boundaries of statistics and application scenarios. With the help of Internet data, it is possible to track and analyses consumption behavior and portray the dynamic evolution of demand structure. Using satellite remote sensing images, it is possible to monitor the progress of construction of industrial parks and infrastructures and objectively assess the quality of regional development. Through the semantic analysis of unstructured text data, such as financial statements of enterprises and annual reports of listed companies, new trends in industrial development can be discovered. In the era of digitalization, artificial intelligence is becoming a new engine driving the innovative development of economic statistics. How to take the initiative to comply with this trend and promote the deep integration of artificial intelligence and economic statistics is a major issue in front of theoretical and practical workers.

In the era of artificial intelligence, the research paradigm of statistical theory is undergoing profound changes. First, the research object from small data to big data. Many classical theories of statistics are based on the premise of data scarcity, and artificial intelligence is good at 'gold' from the massive heterogeneous data, which requires us to break through the traditional sampling inference, the development of the theory of statistical inference based on the full sample [23]. Second, the analysis method from deterministic to random. Traditional statistical models are mostly linear, parametric, with strong certainty and interpretability. Machine learning models are often non-linear, non-parametric, more

concerned about the portrayal of stochastic processes, and try to find the inner law. This requires innovative statistical modelling paradigm, the development of statistical models that can handle high-dimensional data and capture complex relationships. Thirdly, statistical inference is moving from causality to relevance. In the big data environment, it is more and more difficult to make strict causal inferences about complex phenomena, while machine learning models pay more attention to the correlation between variables. This requires careful assessment of the extrapolation of statistical conclusions to prevent over-interpretation and misuse. Fourth, the research perspective from static equilibrium to dynamic evolution. The advantage of artificial intelligence lies in the real-time monitoring and rapid response to the dynamic change process, which helps to examine the formation mechanism and transmission law of economic phenomena from a vertical perspective. This requires the development of non-stationary time series, stochastic differential equations and other dynamic statistical models to dynamically portray the volatility and complexity of the economy.

The practical application of economic statistics will also embrace AI in many ways. Firstly, it is necessary to innovate the way of data collection. Making full use of Internet big data, administrative record data and other new data sources, breaking through the time and space limitations of traditional questionnaire surveys, and realizing intelligent and normalized data collection. Second, optimize the statistical production process. Using natural language processing, knowledge mapping and other artificial intelligence technologies, we will accelerate the processing and transformation of unstructured data, and improve the level of data integration, sharing and correlation analysis. Expanding the content of statistical services. Actively carry out monitoring and early warning of economic operation, analysis of the macroeconomic situation, industrial development trend research and other intelligent applications, to provide accurate and personalized services for scientific decision-making. Fourth, strengthen statistical capacity building. Vigorously cultivate composite statistical talents, systematically carry out knowledge updating and skills training for statistical practitioners, and enhance the ability of data analysis, utilization and application of artificial intelligence. Fifth, improve the data security mechanism. Improve the security and protection measures for the collection, transmission, storage and use of statistical data, strengthen the protection of important data and personal privacy, and build a solid defense line for the security of statistical data.

In general, to promote the development of economic statistics measurement and artificial intelligence, not only to comply with the information technology, digital era trend, but also to enhance the timeliness, relevance and predictability of economic statistics is an inevitable requirement. To establish the awareness of data value, accelerate the construction of artificial intelligence-driven economic statistics modernization system [24], promote theoretical innovation, system improvement, process reengineering and capacity enhancement, and fully release the potential of statistical data in the modernization of the national governance system and governance capacity. This is of great significance to consolidate the statistical support for the construction of socialist modernization with Chinese characteristics and promote high-quality development.

4.4 Focus on the integration of science and reality, and promote the diversified transformation of academic achievements

The significance of scientific research lies not only in exploring the unknown, but also in serving the reality. Economic statistics is a highly applied discipline, and its development level directly affects the quality of social and economic operation monitoring and macro-control policy making. At present, in the face of the new normal of economic development and the new situation of statistical work, there is an urgent need to cultivate the theoretical foundation of economic statistics, accelerate the transformation and application of theoretical innovations, and provide intellectual support for the improvement of national statistical monitoring and early-warning capacity.

Theoretical innovation and the transformation of achievements are the two wings of the development of the discipline, which are complementary and indispensable. On the one hand, theory is the forerunner of practice. Theoretical research on economic statistics should be based on the national situation and public opinion, gain insight into the real needs, and point out the direction for promoting the reform and innovative development of statistics. We should adhere to the problem orientation, focus on the deep-rooted contradictions that affect the quality of statistical data and constrain the improvement of statistical governance capacity, strengthen the theoretical traceability and methodological innovation, and provide ideas and countermeasures for cracking the bottlenecks and problems that constrain the modernization of statistics. On the other hand, practice is the source of theory. Economic and social development, statistical practice in the innovation. Only by closely combining theoretical study and research, and sublimating theoretical understanding in solving practical problems, can we form grounded and viable academic results. To establish and improve the working mechanism of statistical theory and practice, encourage and support statistical workers to go deep into the grassroots and front-line, to understand the demands of statistical reform and development, summaries and refine the practical experience, and sharpen the theoretical quality in the sharpening and refining.

The transformation from statistical theory to statistical practice should not only follow the basic law from abstract to concrete and from general to specific, but also be based on the stage-by-stage characteristics of the development of China's statistical cause. Horizontally, the basic conditions and development levels of statistical work in different regions and departments are not the same, so the transformation of results should be tailored to local conditions and guided by categories. It is necessary to strengthen the statistical infrastructure at the grass-roots level, respond to the relatively weak statistical capacity of counties and townships, increase the popularization and localization of statistical theoretical achievements, explain abstract statistical principles with examples around us, and improve the acceptability of theories. Vertically, the process of statistical reform and development is still facing a lot of new situations and new problems, and the transformation of the results should adhere to the steady progress, step by step. It is necessary to grasp the relationship between the plan and the market, play the leading role of government statistics, and mobilize social forces to participate in statistics. It is necessary to coordinate the reform, development and stability,

strengthen the construction of the rule of law in statistics, and steadily promote statistical innovation on the track of the rule of law.

The transformation of theoretical achievements into practice requires the establishment of efficient and convenient channels. Firstly, we need to establish a departmental collaboration mechanism. Break down the barriers of statistical departments, universities, research institutes, etc., and regularly carry out joint research to promote exchanges and mutual understanding between theory and practice, academia and industry [25]. Secondly, we should improve the scientific research management system. In the project, funding, the introduction of talents and other aspects of the application-oriented tilt, to provide policy protection for the theoretical results. Thirdly, we should innovate the way of releasing the results. Comprehensive use of statistical bulletins, policy interpretation, data visualization and other forms, with easy-to-understand language to explain the terminology, with vivid and informative cases to explain the theoretical meaning, to enhance the effective supply of statistical products and services. Fourth, we should strengthen publicity and training. Through business lectures, on-site observation, experience exchange, etc., to help statisticians grasp the cutting-edge theoretical developments in a timely manner, improve the ability to apply what they have learnt. Fifth, we should do a good job of supervision and evaluation. The application of theoretical results into the statistical performance appraisal system, timely detection of problems, and promote the transformation of results into reality.

Colleges and universities and research institutes are the main position for theoretical research and talent training, and shoulder important missions in serving the overall situation of economic and statistical reform and development. We must adhere to the country, for the party to educate people, aiming at the development of statistics needs to adjust the layout of disciplines and specialties, and strengthen the training of complex and applied talents [26]. We should insist on facing the world and modernization, strengthen international academic exchanges and cooperation, actively participate in global statistical governance, and enhance our influence and discourse power in the international statistical community. We should insist on emancipating the mind and seeking truth from facts, dare to explore the frontier fields and carry out subversive innovations, develop in perseverance and innovate in development, and create a new situation for theoretical research on economic statistics.

4.5 Deepen international exchanges and broaden the influence of economic statistics discipline

In today's era, openness, integration and mutual benefit is the main theme of world development. It is not spring when one flower blooms alone, but when a hundred flowers bloom together, the garden will be full of spring. The innovative development of the theory and practice of economic statistics needs to strengthen the international perspective of the general connection. This is a necessary way to enhance the international influence of economic statistics in China and to promote the building of a community of human destiny.

Strengthening international academic exchanges and co-operation is the rightful meaning of economic statistics theoretical research. Since the reform and opening up, China's statistical community and international counterparts have carried out fruitful exchanges in many fields, but still face the problems of weak discourse power and low participation. At a time when changes in the global economic governance system are accelerating, we need to integrate into the global statistical governance with a more open attitude, and make more Chinese voices and provide more Chinese programmers in the international arena. Firstly, we have to innovate the external exchange platform. We will actively seek to host international statistical conferences, symposiums and other high-end academic meetings, and build a platform for face-to-face exchanges between Chinese and foreign statistical scholars. Encourage domestic statistical journals to set up English editions, so as to build a high-level international academic exchange carrier. Secondly, it is necessary to enhance the influence of international discourse. Strengthen practical cooperation with the United Nations, the World Bank and other international organizations, deeply participate in statistical monitoring and evaluation in the fields of sustainable development, poverty reduction, climate change, etc., and promote the statistical indicator system and monitoring methodology with Chinese characteristics to enter the international rules and standards. Thirdly, it is necessary to broaden the channels of talent training. We should support young and middle-aged statisticians to visit universities and research institutes in developed countries, encourage overseas students to study statistics in China, and cultivate a batch of high-level statisticians with global vision. At the same time, it is necessary to give full play to the advantages of overseas Chinese resources and leverage the strength of the overseas statistical community, so as to enhance the influence of socialist statistics with Chinese characteristics and add colors to it.

Expanding foreign statistical assistance is an important way to enhance the international influence of economic statistics. At present, the statistical foundation of the majority of developing countries is weak, and statistical capacity building needs to be strengthened urgently. As the world's second largest economy and the largest developing country, China has the responsibility and ability to provide statistical support to developing countries to the best of its ability. Adhering to the correct concept of righteousness and benefit, China will increase its statistical assistance to Africa, Southeast Asia, Latin America and other regions, focusing on supporting statistical infrastructure construction, training of statistical personnel and other projects, so as to help the recipient countries to improve their statistical systems and upgrade their statistical standards. It is necessary to adhere to the principle of tailoring statistical assistance to the needs of different countries, and to tailor-make statistical capacity enhancement programmers according to the actual needs of different countries' statistical work. We should pay attention to the effectiveness of statistical assistance, strengthen the performance evaluation of the assistance projects, and establish a sound long-term mechanism for statistical assistance. Through statistical capacity building assistance, we can share the valuable experience of China's statistical reform and development, enhance friendship and mutual trust with the majority of developing countries, jointly promote the

implementation of the United Nations 2030 Agenda for Sustainable Development, and contribute to the building of a community of human destiny.

To promote economic statistics 'going out', it is necessary for the government, universities, enterprises and other parties to join hands to create a new pattern of international exchange and cooperation in an all-round way, at multiple levels and in a wide range of fields. We should accelerate the cultivation of multinational statistical enterprises with global competitiveness, support them to expand their overseas business, participate in major international projects, and shape the brand of China's statistical services [27]. Encourage universities with strength to 'go out' to carry out international co-operation in statistical disciplines, and jointly cultivate high-level statistical talents with foreign universities. Support industry associations, societies and other social organizations to play the role of a bridge and actively carry out civil exchanges in the field of statistics. At the same time, we should pay attention to the role of overseas Chinese and foreign students, and broaden the channels of international exchanges with the help of their overseas contacts and resources.

Promoting economic statistics to play a greater role in the international arena is not only a practical need to adapt to the development trend of economic globalization in the new era, but also an intrinsic requirement to enhance the country's cultural soft power and tell a good Chinese story. In the international exchanges, we should not only uphold the sea of tolerance, eclecticism, humbly learn from foreign advanced experience and practice, but also firm cultural confidence, based on China's national conditions, summing up and refining the characteristics and advantages of socialist statistics with Chinese characteristics, in the exchange of mutual understanding to achieve common development [28]. Only by further expanding the opening of statistics to the outside world, actively integrating into the trend of global statistical development, and promoting the construction of a new global statistical order of mutual respect, fairness and justice, and win-win cooperation, China's economic statistics can show new style and achieve new performance on the international stage, and provide a powerful statistical guarantee for the building of a strong socialist modernization country and the realization of the Chinese dream of the great rejuvenation of the Chinese nation.

5. Economic Measurement and Economic Statistics with Chinese Characteristics

5.1 Strengthening the theoretical foundation of economic statistics research from a Chinese perspective

The development of a theoretical system of economic statistics with Chinese characteristics is an honorable mission entrusted to the discipline of economic statistics in the new era. This is not only an inevitable requirement for adhering to the direction of reforming China's socialist market economy and taking the road of socialism with Chinese characteristics, but also an urgent need to enhance the discourse power and international influence of China's economic statistics. The great achievements of China's economic development have provided a broad practical ground for the theoretical research of economic

statistics. We should base ourselves on China's national conditions, root ourselves in China's practice, take Marxism as our guide, conduct in-depth research on the laws of measurement of economic activities under the conditions of socialist market economy, and endeavor to build a theoretical system of economic statistics with Chinese characteristics.

The economic base determines the superstructure, and a country's economic system and stage of development profoundly affect and constrain the content, mode and role of economic statistics. Since the reform and opening up, China has gradually established and continuously improved the socialist market economic system, and its economic strength, scientific and technological strength, and comprehensive national strength have jumped to a new level. At the same time, China's economic development has also presented many new situations and new characteristics, centered on the new normal of economic development. Firstly, economic growth has shifted from a high speed to a medium-high speed. Second, structural adjustment has shifted from quantitative expansion to qualitative improvement. Thirdly, the driving force of growth has shifted from traditional factor inputs to innovation. This requires us to take stock of the situation, adjust the emphasis and focus of economic statistics according to the stage characteristics of economic development, improve the system of statistical indicators, improve the system of statistical surveys, improve the quality of statistical data and the level of statistical analyses, so as to better serve the Party and the country.

To build a theoretical system of economic statistics with Chinese characteristics, it is necessary to follow the law of development of socialist market economy. On the one hand, we should inherit and carry forward the theoretical insights of Marxist political economy on the basic laws of commodity economy, firmly grasp the economic laws such as socialized mass production and the law of value, and on this basis, study how to set up a system of accounting indexes reflecting the characteristics of the operation of socialist market economy. For example, in the era of planned economy, we accounted for the national economy mainly through the balance sheet of material products, but after the reform and opening up, we gradually established the SNA accounting system. This change is precisely adapted to the requirements of the market to play a decisive role in the allocation of resources, reflecting the guidance of theory to practice. On the other hand, we need to correctly understand the new situation and new problems faced by statistical surveys under the conditions of market economy, and deepen the understanding of statistical laws in practice. For example, the vigorous development of non-public economy has brought new challenges to the definition of statistical survey objects, the design of statistical indicators and data collection, which need to be solved in the interaction between theory and practice.

The development of economic statistics theory with Chinese characteristics must be guided by Xi Jinping's thought on socialism with Chinese characteristics in the new era. Since the 18th CPC National Congress, the CPC Central Committee with Comrade Xi Jinping at its core has accurately grasped the new development stage, deeply implemented the new development concept, accelerated the construction of a new development pattern, coordinated the promotion of the ‘Five-in-One’ overall layout and the ‘Four Comprehensives’ strategic layout, and led China's economy to stand majestically in the east

of the world. A series of important expositions by General Secretary Xi Jinping on statistics have pointed out the way forward for the modernization of statistics in the new era. We should study and understand them carefully, and take them as the fundamental guideline for advancing the theoretical innovation of economic statistics. We should adhere to the people-centered approach, focus on meeting the growing needs of the people for a better life, strengthen the statistical monitoring of livelihood indicators, and improve the statistical evaluation system for shared development. We should practice the new development concept, improve green development indicators, establish resource and environmental accounting accounts, and promote the compilation of natural resources balance sheets. Based on the new development stage and focusing on high-quality development, we should improve the statistical monitoring of supply-side structural reform and improve the statistical system of innovation-driven development. It is necessary to take the initiative to serve and integrate into the new development pattern, and accelerate the construction of a statistical monitoring system that is mainly based on the domestic macro-cycle and mutually reinforcing the domestic and international double-cycle. Xi Jinping's Economic Thought on Socialism with Chinese Characteristics in the New Era provides the ideological weapon and action guide for the development of socialist statistics with Chinese characteristics.

The sustained and healthy development of China's economy provides a practical basis for the construction of economic statistics theory with Chinese characteristics. Since the reform and opening up, China's total economic output has risen to the second place in the world, its per capita income has reached the level of upper-middle-income countries, it has made decisive achievements in building a moderately prosperous society in all aspects, and it has begun a new journey of building a modern socialist country in all aspects. The vivid practice of China's road, China's system and China's programmed has also revealed many new economic and development laws that need to be theoretically outlined and refined. For example, the digital economy, as a new economic growth point, is becoming an important force leading economic development. At present, all countries are laying out their digital economic accounting and seizing the right to talk about statistics. China should seize the development opportunity of digital industrialization and industrial digitization, accelerate the establishment of a statistical monitoring system for the digital economy, explore the theory and methodology of digital economic accounting, and take the lead in the formulation of international rules for digital economic statistics. For example, China's regional economy has shown a differentiated development trend, and the eastern, central and western regions have their own characteristics in terms of industrial structure and growth patterns. Regional economic statistics should be based on the basic national situation of unbalanced and inadequate regional development in China, strengthen the monitoring of regional economic operation, improve the statistical indicators of regional development, and provide statistical support for coordinated regional development. All these provide vivid cases and practical materials for the enrichment and development of socialist political economy with Chinese characteristics and the innovation of economic statistics theory with Chinese characteristics.

In short, socialism with Chinese characteristics has entered a new era, and the tasks of reform, development and stabilization are unprecedented in terms of the number of contradictions, risks and challenges, as well as the test of governance. We should base ourselves on the overall situation of the strategy for the great rejuvenation of the Chinese nation and the great changes that have not occurred in the world for a hundred years, think of the "country's greatness", raise our political position, insist on theoretical self-confidence, plan and push forward the theoretical innovation of economic statistics from the high level of the overall situation of the development of the Party and the national cause, and push forward the reform and development of statistics with the tenacity of "biting the green mountain and not letting it go", and insist on and develop the socialist statistics with Chinese characteristics in keeping the right and innovating to create a new situation for the cause of economic statistics, to contribute to the comprehensive construction of socialist statistics and to the development of socialist statistics. We will create a new situation for the cause of economic statistics and provide solid statistical guarantee for the comprehensive construction of a modernized socialist country and the realization of the Chinese dream of the great rejuvenation of the Chinese nation.

5.2 Drawing on international experience and strengthening academic exchanges and cooperation among international organizations

Statistics is a highly applied discipline. With different levels of economic and social development and different institutional and cultural backgrounds in different countries, the practice of economic statistics also shows significant differences. However, as a scientific method, its basic principles are universal. Since the reform and opening up, China's statistical theorists have always insisted on emancipating the mind, seeking truth from facts, and learning from the latest achievements of foreign statistical theories, and have achieved fruitful results. Since the 18th CPC National Congress, General Secretary Xi Jinping has emphasized many times that we should be good at learning, actively learn from foreign useful practices, and promote the reform and innovation of statistics in the openness. It can be said that opening up to the outside world is an important magic weapon for the continuous progress of China's economic and statistical undertakings. To promote the modernization of statistics in the new era, it is necessary to further open up the field of statistics to the outside world, and strengthen academic exchanges and cooperation with international organizations and foreign universities and think tanks.

First of all, we should actively participate in the statistical activities of the United Nations, the OECD, the International Statistical Institute and other international organizations, and deeply integrate into the global statistical governance. At present, the international community has carried out a wide range of statistical cooperation around the implementation of the 2030 Agenda for Sustainable Development, the response to climate change and other major issues. As a responsible big country, China must take the initiative to actively participate in the formulation of international statistical rules, such as the SDGs global indicator monitoring and climate change statistical accounting, and put forward "China's program" and contribute "China's wisdom" in the light of China's actual

development. At the same time, it is necessary to strengthen practical cooperation with the statistical departments of major economies, promote international coordination and convergence of statistical standards and systems, and enhance the international comparability of China's economic statistics. In addition, it is necessary to make full use of platforms such as the Statistical Institute for Asia and the Pacific (SIAP) and the BRICS statistical cooperation mechanism to strengthen regional statistical cooperation with neighboring countries and emerging market countries, and to promote the building and sharing of statistical capacity in the region.

Secondly, it is necessary to carry out extensive academic exchanges with foreign universities and research institutions. Since the reform and opening up, China has maintained close academic ties with the statistical circles of the world and achieved fruitful cooperation results. At present, a new round of scientific and technological revolution and industrial change are flourishing worldwide, and modern information technologies such as big data and artificial intelligence are widely penetrating the field of statistics, giving rise to many cutting-edge theories and applications. In this regard, we have to keep an open and tolerant mindset, actively “invite in”, invite famous statisticians from abroad to give lectures in China, encourage domestic universities to cooperate with famous foreign universities in the discipline of statistics, and jointly cultivate high-level and internationalized statistical talents. At the same time, we should take the initiative to go out, support domestic scholars to visit and exchange with top foreign universities and research institutes, publish high-level papers in international academic journals, tell the story of China's statistics, and disseminate the voice of China's statistics.

Again, we should make good use of multilateral and bilateral statistical capacity enhancement mechanisms. Statistical capacity building is a key area of international statistical cooperation. The United Nations, the World Bank and other international organizations attach great importance to the improvement of statistical capacity in developing countries and have set up special funds. In this regard, we should actively strive for projects, funds and other resources, focus on statistical infrastructure construction, training of statistical personnel and other areas, and share China's experience in statistical reform and development with other countries. At the same time, we should give full play to the comparative advantages accumulated in the development of China's statistics, and intensify our efforts to provide statistical assistance to Africa, Southeast Asia, Latin America and other regions, focusing on helping them improve their statistical survey systems and the quality of statistical data. This is not only conducive to enhancing the independent statistical capacity of developing countries, but also contributes to the building of a community of human destiny.

In short, opening up statistics to the outside world is a general trend and the will of the people. This is not only the need for the development of statistics, but also the proper meaning of serving the overall foreign affairs of the country. Statisticians should be open to the world, look to the future, uphold the concept of mutual learning and mutual appreciation, win-win cooperation, and actively participate in global statistical governance. Not only should they learn from foreign advanced experience with an open mind, but also vigorously

publicize and promote the political, theoretical and practical advantages of the socialist statistical system with Chinese characteristics. We should be bold in defending the sovereignty of national statistics and development interests, and good at dialoguing to win the understanding and support of the international community with facts and reasoning. By deepening external exchanges and cooperation, we are fully confident that we can promote the construction of a new global statistical order that is mutually beneficial, fair and reasonable, and contribute China's strength to the progress of the world's statistical cause.

5.3 Bridging hierarchical differences and focusing discussions on deeper issues in economic statistics

There are many schools of statistics and many different streams. Due to the differences in theoretical origins, analytical perspectives, and focuses of different schools of thought, they often hold very different views on many statistical issues. Even within mainstream statistical theories, there are also differences in understanding and misinterpretation due to different levels of research and levels of abstraction. Over time, these differences in viewpoints and theoretical gaps have gradually solidified and become constraints on the innovation of statistical theory and the development of the discipline. In this regard, we need to enhance the awareness of the problem, strive to break the hierarchical divide that exists in statistical theoretical research, focus on fundamental, global, strategic and major theoretical issues, in-depth doctrinal discussions to build consensus, resolve differences, and clear the ideological barriers for the integrated development of statistical disciplines.

Statistical disciplines have many different branches, but they share the same foundation and destiny. Macroeconomic statistics and microeconomic statistics have obvious differences in research objects and analysis methods, but they are complementary and indispensable. Without a solid micro-foundation to support, macro statistics may have the risk of structural imbalance, and micro subjects can hardly perceive development opportunities from macro statistics. On the other hand, if there is no top-level design and overview of macro-statistics, micro-statistics surveys may be fragmented and it is difficult to form a synergy. Therefore, we should adhere to the macro-micro integration, strengthen the basic theoretical research in the fields of economic accounting, input and output, and other macroeconomic statistics, and improve the national economic accounting system. At the same time, we should give full play to the role of “microscope” in statistical surveys, strengthen statistical monitoring of microeconomic subjects such as households and enterprises, and promptly discover the incipient and tendentious problems. The organic integration of macro statistics and micro statistics not only helps to improve the relevance and effectiveness of economic operation monitoring, but also provides a realistic possibility for systematically revealing the inner mechanism of economic development.

The system of statistical disciplines is complicated, but the roots are common and the origin is symbiotic. Statistical theoretical research should be good at using philosophical thinking, guided by the basic law of the development of human cognition from sensibility to rationality and from phenomenon to essence, and explore the commonality and intrinsic

connection of statistical theories of different disciplines and different fields. For example, statistics has a natural relationship with mathematics, and many statistical concepts and methods are based on mathematical theories. In this regard, the statistical community should strengthen the academic dialogue with the mathematical community, absorb the latest achievements of modern mathematics, use the language of mathematics to interpret the principles of statistics, use mathematical methods to innovate statistical analysis techniques, and realize the cross-fertilization of statistics and mathematics. Another example is that statistics is a highly empirical applied discipline, and its theoretical propositions and analytical frameworks often require a lot of practical testing, which is inseparable from the theoretical support of economics, sociology, management and other related disciplines. Statistics should take the initiative to strengthen theoretical dialogues with these disciplines, learn from each other's strengths, and promote the continuous development and improvement of statistical theories in cross-research.

Although statistics is highly specialized, it has never been outside the great practice of the development of the times and social progress. No matter how profound and abstract statistical theories are, they must respond to the real needs and demonstrate the mission and responsibility. To promote the modernization of statistics in the new era, there is an urgent need for statistical theorists to base themselves on the great practice of socialism with Chinese characteristics, closely follow the new situation and new problems faced by the reform and development of statistics, and strengthen the theoretical innovation of the supply side and demand side. On the one hand, we should focus on the high-quality development of the economy, promote the construction of a new development pattern and other major strategic programs, strengthen the theoretical research in the fields of national economic accounting, statistical monitoring of supply-side structural reform, and statistical measurement of coordinated development of the region, so as to strengthen the supportive role of statistics in macro decision-making. On the other hand, we should focus on promoting the modernization of the national governance system and governance capacity, accelerating the construction of a social statistics system with Chinese characteristics, exploring theoretical and practical innovations in statistical monitoring of the residents' sense of access, statistical evaluation of government performance, and statistical analysis of social governance, so as to better satisfy the people's needs for a better life.

To bridge the theoretical divide in statistics, it is necessary to base on the main body and communicate with the branches, as well as to face the practice and serve the overall situation. This puts forward higher requirements for the majority of statistical theorists. We should effectively strengthen the statistical theory, adhere to the guiding position of Marxism, and use the position and viewpoint of dialectical materialism and historical materialism to analyze and solve the statistical theory problems. We should insist on linking theory with practice, consciously practicing the “four services”, writing papers on the motherland, and gathering wisdom and strength to the great cause of statistical reform and development. We should have the courage to take on the role, dare to gnaw on the hard bones, and promote the modernization of statistical theory and the construction of statistics with Chinese

characteristics in the midst of overcoming difficulties. Only in this way can we create a new situation in the theoretical research of economic statistics, provide solid doctrinal support for the modernization of statistics, and greet the 100th anniversary of the founding of New China with excellent results.

5.4 Innovate based on national conditions and strengthen academic discourse on economic statistics

With the significant enhancement of its comprehensive national power and international status, China is getting closer to the center of the world stage and playing an increasingly important role in global affairs. Accordingly, China's ideas, programs and voices have received more and more attention from the international community. The report of the 20th CPC National Congress points out that we must insist on placing the development of the country and the nation at the base of our own strength, and insist that China's affairs must be advocated and handled by the Chinese people themselves. Statistics is an important part of the modernization of the country's governance system and governance capacity. Based on the strategic overall situation of the great rejuvenation of the Chinese nation, and focusing on the great changes that the world has not seen in a century, we should continuously enhance our ability to do Chinese statistics and tell the Chinese story, actively respond to the international concerns, proactively set up issues, lead the global statistical academic trend, and continuously enhance the influence and appeal of socialist statistics with Chinese characteristics in the international arena.

First, we should adhere to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era as a guide. Since the 18th CPC National Congress, General Secretary Xi Jinping's important discussions on statistics have provided a fundamental guideline for the modernization of statistics in the new era. It is necessary to study and implement General Secretary Xi Jinping's important expositions on statistics, raise the political position, strengthen the theoretical armament, guide the practice of statistics with the latest achievements of the Chemicalization of Marxism, and strengthen the consciousness and firmness of doing Chinese statistics and telling the Chinese story. We should draw wisdom and strength from the Party's innovative theories, generate statistical concepts, statistical discourses and statistical expressions with Chinese characteristics by using vivid Chinese practices and vivid Chinese cases, and continuously improve the theoretical character and academic connotation of socialist statistics with Chinese characteristics.

Secondly, we insist on taking root in Chinese soil and summarizing Chinese practice. The historical process and brilliant achievements in the development of statistics in China reflect the inevitable logic of statistics resonating with national governance and walking in the same direction with the development of the times. As an important school of Marxist statistics, socialist statistics with Chinese characteristics must write its thesis on the motherland and gather wisdom and strength into the development of the Party and the country. On the one hand, it is necessary to systematically sort out the basic experience of the development of China's statistical cause, reveal its inherent laws and significant advantages,

and distill a set of statistical theoretical principles and analytical frameworks suitable for China's national conditions and manifesting Chinese characteristics. On the other hand, we should closely integrate with the practice of statistical reform and development, focus on major theoretical and practical issues in statistical monitoring, statistical analysis and statistical services, deepen the innovation of input and output theory in the context of supply-side structural reform, strengthen the research on the statistical evaluation system of the new development concept, and provide strong theoretical support for the improvement of the modernization of the governance system and the governance capacity of national statistics.

Thirdly, we insist on telling the story of Chinese statistics and spreading the voice of Chinese statistics. As an important carrier of national will and development achievements, statistics have wide influence in the international community. Telling the story of China's statistics well is the proper meaning of statistical work to serve the overall situation of the Party and the country. On the one hand, it is necessary to utilize big data to vividly present the historic achievements and changes in China's economic and social development through charts and graphs, audio and video, and other forms of informative data and vivid cases. It is necessary to strengthen the interpretation of data and background explanations to help the international community understand China's statistics, and improve the international dissemination and influence of statistics and statistical analysis. On the other hand, we should make good use of internationally recognized statistical rules and standards to tell China's story and enhance the authority and credibility of statistics. When foreign countries question China's statistical data, we should respond positively, clarify the facts and explain the doubts with justifications, and firmly safeguard the seriousness and authority of national statistical data.

Fourth, we insist on strengthening global statistical governance and leading the international statistical discourse. At present, the world is experiencing a new round of scientific and technological revolution and industrial change, and new economic forms such as digital economy and green development are flourishing, bringing new challenges to the global statistical governance system. The international game around GDP accounting, digital economy statistics, climate change statistics and other major issues is becoming more and more intense, and the major powers have seized the commanding heights of statistical rule-making. In this regard, we have to maintain and expand the fundamental interests of the country, actively participate in global statistical governance, and strive to have more say in the formulation of international statistical rules. We should take the initiative to set up issues and promote the establishment of a new pattern of global statistical governance with North-South dialogue and East-West mutual understanding. In areas where China has significant comparative advantages, such as the digital economy and green GDP, we should have the courage to “set the tide to the head of the wave”, and promote China to take the lead in formulating relevant international statistical standards. We need to strengthen solidarity and cooperation with developing countries and promote the development of international statistical rules in the direction of greater fairness, justice, universality and inclusiveness.

As a highly applied discipline, economic statistics must be based on China, look at the world, and promote the construction of Chinese discourse, Chinese theory, Chinese method of discourse and expression system. This is not only the objective requirement of adapting to and leading the development trend of economic globalization, but also the realistic need to enhance the soft power of national culture and create a strong socialist culture. The majority of statistical theorists should further emancipate their minds, keep abreast of the times, consciously shoulder the glorious mission entrusted to them by the new era, forge ahead, innovate, and accelerate the construction of economic statistics with Chinese characteristics, Chinese style, and Chinese flavor, and strive to realize a great leap forward from a large economic country to an economically powerful country and from a large statistical country to a statistically powerful country, so that we can greet the victory of the Twentieth National Congress of the Communist Party of China with outstanding achievements. The 20th National Congress of the Communist Party of China will be held.

6. Summary and outlook

The arrival of the digital era is profoundly reshaping the shape of human economic and social development. As the core of digital economy, big data has become a new engine to promote high-quality economic development and a new dimension to measure the comprehensive strength and core competitiveness of the country. As a discipline with strong application, economic measurement and economic statistics must follow the trend of the times, seize the opportunity of digital development, innovate comprehensively in concept, theory, methodology and system, promote the formation of a statistical system and monitoring mechanism compatible with the digital economy, and enhance the modernization level of economic statistics in an all-round way.

This paper analyzes the new opportunities and challenges brought by the development of digital economy to the discipline of economic statistics on the basis of the outstanding contradictions and deep-rooted problems facing the development of China's economic statistics, and puts forward a number of ideas and countermeasures for the innovative development of economic measurement and economic statistics. We should establish the concept of modern economic statistics, grasp the new trends and characteristics of economic and social development in the digital era, respect the laws of data, give full play to the value of data, and promote the modernization of statistical data governance. We should adhere to the guidance of Marxism, based on China's national conditions, draw on international advanced experience, and accelerate the construction of the discipline system, academic system and discourse system of economic statistics with Chinese characteristics. We will strengthen the basic theoretical research on economic statistics, improve the national economic accounting system, expand and innovate macroeconomic statistics, and promote the formation of a statistical indicator system that reflects the requirements of high-quality development. We will vigorously develop digital economy statistics, accelerate the establishment of a statistical monitoring system for the digital economy, explore the theory of measurement and accounting methods for digital industrialization and industrial digitization, and strengthen the research and judgment of the operating situation of the digital economy.

We have to make full use of big data, artificial intelligence and other modern information technology, innovate the mode of statistical data collection and processing, promote the re-engineering of statistical production process, and comprehensively enhance the level of statistical modernization. We need to build a high-quality economic and statistical talent team, improve education and training, practice, exchange and cooperation mechanisms, and accelerate the cultivation of complex, applied and innovative statistical talents.

Promoting the modernization of economic statistics in the new era is a systematic project that requires the joint efforts of all parties and long-term efforts. On the one hand, colleges and universities, as the main force of theoretical innovation in disciplines, should strengthen the construction of disciplinary systems, deepen the research on major theoretical and practical issues, accelerate the construction of a number of high-level disciplines and research bases of economic statistics, and create an academic community of economic statistics. We should take the initiative to meet the needs of statistical reform and development, strengthen the exchange and cooperation with the statistical practice departments, and promote the transformation of theoretical achievements into statistical governance practice. On the other hand, as the main battlefield of statistical reform and development, the government statistical department should strengthen the top-level design, enhance statistical legislation, improve the statistical management system and mechanism, improve the statistical survey system and methodology, and enhance the quality and credibility of statistical data. It is necessary to increase the statistical infrastructure construction at the grass-roots level to strengthen the foundation of statistical data quality. It is necessary to innovate the supply of statistical services, enhance the development and utilization of statistical big data and the level of informatization, so as to better satisfy the scientific decision-making of the Party committee and government and the diversified needs of the public. In addition, it is necessary to play the decisive role of the market in resource allocation, mobilize social forces to participate actively, and establish a pattern of complementary sharing and benign interaction between government statistics and third-party data, so as to jointly promote the modernization of statistics.

With the further acceleration of the development of digital economy in the future, the requirements for the theoretical innovation and practical development of economic statistics will also be continuously raised. China's economic statistics community should be based on the new development stage, implement the new development concept, serve to build a new development pattern, and accelerate the modernization of statistics. It should adhere to the overall leadership of the Party, consciously practice the “four services”, and give full play to the fundamental and strategic role of statistics in the modernization of the national governance system and governance capacity. It is necessary to strengthen cross-fertilization with mathematics, computer science, artificial intelligence and other disciplines, promote the innovative application of modern information technology such as big data, blockchain and artificial intelligence in the field of economic statistics, and explore the theories, methods, systems and processes of economic statistics in the era of digital economy. It is necessary to actively participate in global statistical governance, strengthen exchanges and cooperation

with international organizations such as the United Nations and relevant national statistical departments, and enhance the international influence and discourse power of China's economic statistics.

Great cause calls for great creation, and great creation breeds great spirit. In the face of the flood of the era of digital economy development, the majority of economic statisticians should bravely bear the historical mission, set up a lofty ideal, maintain a high morale, work hard, forge ahead, and make new and greater contributions to promote the modernization of statistics and serve the high-quality development of the economy and society. Let us closely unite around the CPC Central Committee with Comrade Xi Jinping as the core, adhere to the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics in the New Era, fully implement the spirit of the 20th CPC National Congress, accelerate the construction of a world-class discipline of economics and statistics with Chinese characteristics, and make unremitting struggles for the construction of a modernized socialist country in an all-round way, and for the realization of the Chinese dream of the great rejuvenation of the Chinese nation!

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