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Research On the Impact of Data Assetization on Enterprise New Quality Productivity

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Abstract: In the era of digital economy, data assets have become one of the key assets that affects the competitiveness of enterprises. The most important assets of enterprises since the 21st century is data; An important factor to significantly improve the production level and production efficiency of enterprises, and also an important engine to promote the transformation of enterprise productivity from “old” to “new”. How to manage and apply data assets to promote the development of new quality productivity of enterprises is one of the important issues for the survival and development of enterprises in the era of digital economy. As an important step in mining the value of data, data assetization has aroused extensive attention and discussion on the enabling effect and enabling way of new quality productivity.

This paper focuses on the specialized small and medium-sized enterprises, and studies the impact and mechanism of data assets on the new quality productivity of enterprises. The results show that: 1. The improvement of data assets will help to promote the development of new quality productivity in a variety of specialized company sizes. 2. Data assets can significantly improve the new quality productivity of specialized companies, and its core mechanism as follows: data credit enabling and capital allocation optimization; collaborative optimization of intelligent decision-making and operation; knowledge precipitation and R&D paradigm transformation; demand insight and driving mechanism of industrial upgrading; ecological coordination and value network reconstruction. 3. Data assets play a stronger role in promoting the new quality productivity of firms with smaller scale, higher information transparency and those in the western region.

Keywords: Data Assetization; New Quality Productivity; Specialized Small and Medium-Sized Enterprises

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1.Introduction

In the context of the digital economy, data has become a key factor of production alongside: land, labor, capital and technology - profoundly reshaping the global economic development model and competition pattern. With the in-depth development of the new round of technological revolution and industrial transformation, the value creation capacity of data elements is increasingly prominent[1]. Data assetization, as an important path to release the value of data elements, is attracting widespread attention and practical exploration worldwide. China is currently at a critical stage of high-quality economic development, and cultivating new quality productivity has become a strategic choice to promote industrial upgrading and transformation of economic growth patterns. Data assetization, by empowering enterprises to innovate and develop, is becoming an important engine for generating new quality productivity. Against this macro background, in-depth exploration

of the impact mechanism of data assetization on enterprises' new quality productivity has significant theoretical significance and practical value.[2]

At present, the construction of the data element market in China is in a stage of rapid development. From the policy perspective, the state has successively issued important documents on enterprise data, providing institutional guarantees and practical guidance for the assetization of data. From the perspective of market practice, data exchanges have been established in various regions, and the service system for data registration, evaluation, and trading has gradually improved.[3]Financial innovation products such as data asset pledge financing and data insurance have emerged continuously. Especially in the field of specialized, refined, distinctive, and innovative small and medium-sized enterprises, the assetization of data is becoming an important way to solve financing problems, enhance innovation capabilities, and strengthen market competitiveness. However, the process of data assetization still faces challenges such as difficulty in rights confirmation, valuation, and accounting entry, and it is urgent to seek breakthroughs through theoretical research and practical exploration.

From the perspective of theoretical development, although existing research has already paid attention to the importance of data elements, the research on the specific mechanism by which data assetization affects the new quality productivity of enterprises is still not systematic. Especially in the context of the accelerated advancement of digital transformation, it is necessary to deeply analyze how data assetization promotes the quality, efficiency, and power transformation of enterprises through optimizing resource allocation, empowering technological innovation, and reshaping business models. This study aims to systematically construct a theoretical framework for the impact of data assetization on the new quality productivity of enterprises, deeply analyze its mechanism of action, and provide theoretical support and practical guidance for promoting the value release of data elements and cultivating new quality.

2.Definition of data capitalization

Data assetization refers to the process by which enterprises transform raw, scattered, and disordered data resources into strategic economic assets that are identifiable, measurable, controllable, and tradable through systematic technical processing, governance integration, value assessment, and compliance-based rights confirmation. This process not only involves the technical organization of data (such as cleaning, tagging, and modeling), but also includes the institutional construction of its property rights, value measurement, and financial empowerment, enabling it to rise from a by-product attached to business operations to an independent core production factor. For specialized, refined, distinctive, and innovative small and medium-sized cities, data assetization is not merely a collection of data, but rather the in-depth extraction and capital reorganization of high-value data accumulated in specialized production, refined operation, and distinctive innovation (such as process parameters, supply chain logs, user behavior trajectories, and R&D test data). Its essence lies in promoting the transformation of enterprises from traditional factor-driven to innovation-driven through the asset recognition of data elements, thereby solidifying the micro-foundation of new-quality productivity.

The theoretical framework of data assetization encompasses multiple dimensions: at the technical level, it requires enterprises to transform raw data into standardized and modular data products (such as API interfaces, analysis reports, and digital twins) through tools like data platforms, Internet of Things perception, and algorithm models; at the management level, a full life-cycle governance system covering data collection, storage, sharing, and destruction needs to be established, along with a clear property rights structure that separates data resource ownership, processing and usage rights, and product operation rights; at the value level, it is necessary to realize the economic value of data assets and their circulation through assessment and pricing, financial instrument design, and market trading mechanisms. For specialized, refined, distinctive, and innovative enterprises, this process particularly emphasizes the deep integration of data elements with the main business, such as optimizing production processes through industrial data modeling or developing differentiated products by leveraging market data insights, ultimately forming a positive cycle of "data-driven innovation - innovation enhancing asset value - value feeding back into R&D".

At present, the development of data assetization in specialized, refined, distinctive and innovative small and medium-sized enterprises (SMEs) shows a phased characteristic of "active policy-driven, nascent practical exploration, and core challenges yet to be resolved". At the policy level, both the national and local governments are making efforts: The "Special Action Plan

for Digital Empowerment of SMEs " jointly issued by the Ministry of Industry and Information Technology and other four departments explicitly requires "supporting SMEs to conduct data asset value assessment and legally and properly record them in the books", and sets the goal of achieving full digital transformation coverage for specialized, refined, distinctive and innovative enterprises and a key process numerical control rate of 75% by 2027. Jiangsu, Zhejiang and other regions have taken the lead in piloting the data intellectual property rights registration system, and through standards such as the "Service Specifications for the Registration of Enterprise Data Resource Holding Rights", they are granting rights and certificates to data, exploring application scenarios such as data asset valuation for equity investment and securitization. For instance, Jiaxing Nanhu District issued the country's first data resource holding rights registration certificate, providing ownership guarantee for data transactions of SMEs; a cultural and tourism enterprise in XingYi, Guizhou obtained bank financing through data intellectual property rights pledge, highlighting the potential of data assets in financial empowerment.

However, specialized, refined, distinctive and innovative enterprises are confronted with core bottlenecks such as difficulty in rights confirmation, valuation, and accounting. Firstly, there is a lack of a unified national standard for the definition of data ownership. Although some localities have explored the "registration certificate" model (such as Hangzhou and Jiaxing), the cross-regional mutual recognition mechanism has yet to be established, leaving enterprises under the pressure of both legal risks and high compliance costs. Secondly, the data valuation system is still immature. Traditional cost and income approaches are not suitable for the scenario dependence and value volatility of data assets, leading to cautious risk control by financial institutions and limited scale of pledge financing. Moreover, although the Ministry of Finance has promoted the inclusion of data resources in financial statements, small and medium-sized enterprises, due to the lack of professional talents and financial norms, face challenges in practical operations such as the absence of accounting measurement and disclosure standards. Additionally, there are also technical obstacles: most companies have weak data governance capabilities, with a low proportion of DCMM (Data Management Capability Maturity) standardization, and data quality is uneven and isolated, making it difficult to support the transformation of high-value assets.

3.Definition of new quality productivity

New-quality productivity is the modernization of Marxist productivity theory with Chinese characteristics in the era of digital economy. Its core essence lies in being led by scientific and technological innovation, breaking away from traditional economic growth paths and productivity development models, and embodying the characteristics of high technology, high efficiency, and high quality, which conforms to the advanced productivity state of the new development concept. It is not a breakthrough in a single technology or element, but a systematic leap in productivity driven by revolutionary technological breakthroughs, innovative allocation of production factors, and in-depth transformation and upgrading of industries. New-quality productivity emphasizes the creation of new industries, new models, and new driving forces through original and disruptive scientific and technological innovation, promoting the evolution of production factors to more advanced and complex forms. Its essence is productivity where innovation plays a leading role. For the group of specialized, refined, distinctive, and innovative small and medium-sized enterprises (hereinafter referred to as "specialized, refined, distinctive, and innovative enterprises"), the development of new-quality productivity is not only about technological upgrading but also means the reshaping of their status as innovation subjects and the climbing of their positions in the global value chain.

In terms of theoretical framework, new-quality productivity presents multi-level structural features. Firstly, its factor structure undergoes fundamental changes, with data as a new type of production factor deeply integrated with traditional factors such as labor, capital, land, knowledge, technology, and management, enhancing the efficiency of resource allocation and stimulating the improvement of total factor productivity. Secondly, its technological foundation is composed of clusters of cutting-edge technologies, with disruptive and frontier technologies such as artificial intelligence, advanced manufacturing, new materials, and biotechnology becoming the core engines driving growth, promoting the transformation of the industrial paradigm from "factor-driven" to "innovation-driven". Thirdly, its industrial carriers are highly modernized, reflected not only in the cultivation and expansion of strategic emerging industries and future industries but also in the high-end, intelligent, and green transformation of traditional industries through digitalization and environmentally friendly. Specialized, refined, distinctive, and innovative enterprises, as the main force of innovation focusing on niche markets and mastering key core

technologies, their development state directly affects the micro foundation of new-quality productivity.

As the key bearers and practitioners of new-quality productivity, the "newness" of the productivity state of specialized, refined, distinctive, and innovative enterprises is mainly reflected in three aspects: technological novelty, outstanding efficiency, and sustainable development. Technological novelty refers to the formation of "filling the gap", "strengthening the weak points", or "filling the blank" technological advantages in specific fields through independent research and development or collaborative innovation, with their innovation activities featuring high R&D intensity, high patent density, and high market exclusivity, such as developing key components or specialized equipment to replace imports. Outstanding efficiency is demonstrated by achieving cost reduction and efficiency improvement as well as precise control throughout the entire process through lean production, intelligent transformation, and digitalization, with their labor productivity per capita, resource utilization rate, and product quality stability reaching industry-leading levels, such as realizing predictive maintenance of production equipment and dynamic optimization of energy consumption through industrial internet platforms. Sustainable development requires embedding green and low-carbon concepts into the entire process of product design, process selection, and supply chain management, achieving the unification of economic and ecological benefits through the development of energy-saving products, the use of clean energy, and the reduction of waste emissions.

The generation and expansion of new-quality productivity in specialized, refined, distinctive, and innovative enterprises highly depend on the collaborative empowerment of the innovation ecosystem. This ecosystem, with enterprises as the main body, universities and research institutions providing knowledge spillover and technological support, the government providing institutional supply and policy incentives, and financial institutions providing risk capital and financing services, jointly form a support network promoting a virtuous cycle of technology, industry, and finance. The role of the government lies in creating an institutional environment conducive to original innovation through industrial policies, innovation funds, and tax incentives, especially addressing issues such as insufficient investment in basic research and poor conversion of scientific and technological achievements. Financial institutions need to innovate financial tools and develop businesses such as intellectual property pledge and data asset financing to alleviate the financing constraints faced by light-asset-operating technology enterprises. Only when the innovation chain, industrial chain, capital chain and talent chain are deeply integrated can specialized, refined, distinctive and innovative enterprises break through the innovation bottleneck of long research and development cycles and high uncertainty and continuously climb to the high end of the value chain.

4.Research on the effect mechanism of data assets on new quality productivity of enterprises

4.1 Mechanism 1: Data Credit Empowerment and Capital Allocation Optimization Mechanism

The core of the data credit empowerment and capital allocation optimization mechanism lies in the transformation of data assets to improve information asymmetry, reshape the enterprise credit system, guide the precise allocation of financial resources, and break the financing constraints of scientific and technological innovation activities. During the process of data assetization, enterprises collect, govern, confirm the rights to, and value their internal and external data, making the potential value of their data resources explicit and quantifiable. Particularly with the implementation of the "Interim Provisions on Accounting Treatment of Enterprise Data Resources", eligible data resources can be included in financial statements, providing a system foundation for data assets to serve as new types of collateral and credit endorsements. For technology-oriented small and medium-sized enterprises with abundant data assets but lacking traditional collateral, their innovation capabilities, market prospects, and user value can be more comprehensively demonstrated through data assets. Financial institutions can leverage big data risk control models to integrate and analyze multi-dimensional information such as transaction flows, logistics information, patent dynamics, and public opinion data of enterprises, conducting more accurate credit profiling and risk assessment. This enables credit resources to break free from the traditional reliance on fixed asset collateral and financial indicators, and flow more effectively to those "specialized, refined, distinctive, and innovative" enterprises with high growth potential and high technological content, addressing the most critical issue of capital supply for the development of new quality productivity. Research shows that data assets can effectively alleviate the financing constraints of enterprises, thereby enhancing their willingness and ability to invest in innovation. This process not only

optimizes the capital structure of micro-enterprises but also enhances the overall efficiency of capital allocation in society, providing fertile financial soil for the nurturing of new quality productivity.

4.2 Mechanism 2: Intelligent Decision-making and Operational Synergy Optimization Mechanism

The core of the intelligent decision-making and operational synergy optimization mechanism lies in the data assetization breaking down information silos, empowering real-time perception and intelligent decision-making across the board, achieving a leap in full-chain efficiency, embodying the "high efficiency" feature of new quality productivity. Data assetization is not merely the accumulation of data but involves building a unified, standardized, and high-quality enterprise-level data platform and indicator system to transform raw data into "data asset units" that can be directly utilized by business. This lays a solid foundation for the application of advanced data analysis, artificial intelligence algorithms, and digital twin technologies. At the production level, real-time monitoring and analysis of equipment sensor data, process parameters, and environmental information can achieve predictive maintenance, dynamic energy optimization, and online quality control, minimizing unplanned downtime and quality losses, and enhancing production capacity utilization. At the supply chain level, by integrating and analyzing multi-source data such as market demand, inventory levels, and logistics status, enterprises can achieve precise demand forecasting, dynamic inventory optimization, and intelligent transportation route planning, building a flexible, agile, and risk-resistant supply chain network. For instance, studies show that the application of data assets can significantly reduce enterprise management costs, and many enterprises have achieved substantial cost savings through data application. This not only enables parallel collaboration among internal departments such as R&D, production, and marketing in specialized, refined, distinctive, and innovative small and medium-sized enterprises but also drives real-time networked collaboration among upstream and downstream in the industrial chain, upgrading from a "chain series" model to a "network parallel" model, greatly enhancing total factor productivity and system resilience.

4.3 Mechanism 3: Knowledge Accumulation and R&D Paradigm Transformation Mechanism

The core of the knowledge accumulation and R&D paradigm transformation mechanism lies in converting data into reusable and iterative knowledge assets, promoting the transformation of R&D from "experimental trial and error" to "simulation and emulation", driving revolutionary technological breakthroughs, and solidifying the "high-tech" foundation. The core of new quality productivity is innovation. Data assetization transforms the massive dark data generated in the R&D, experimentation, production, and service processes into structured machine learning fuel and digital twins. In research-intensive fields such as bio-medicine, new materials, and aerospace, AI models trained on high-quality data assets can simulate compound interactions, predict material properties, and optimize complex system designs, enabling massive screening and iteration in the digital space. This significantly shortens the R&D cycle and reduces the high cost of physical trial and error. This new paradigm of "AI-driven R&D" (AI4R&D) transforms the innovation process from an art dependent on individual scientists' experience and inspiration to a systematic and engineering science. Moreover, data assets are non-competitive and reusable. A high-quality experimental data-set or a trained algorithm model can be reused in different projects and teams, continuously generating value and accelerating the accumulation and inheritance of knowledge. This not only solves the problem of innovation efficiency but also may bring unexpected original innovations in basic research, serving as a key mechanism for achieving "breakthroughs from 0 to 1".

4.4 Mechanism 4: Demand Insight and Industrial Upgrade Driving Mechanism

The core of the demand insight and industrial upgrade driving mechanism lies in using data assets to deeply understand users and the market, promoting precise matching of supply and demand, fostering new business forms, and guiding industries towards high-end evolution. Data assets enable enterprises to perceive, understand, and predict market demands in real time with unprecedented granularity. By analyzing user behavior data, sentiment tendencies on social media, and product usage data from sensors, enterprises can not only discover explicit demands but also uncover latent demands that users themselves are not aware of. This drives the production model to shift from traditional mass manufacturing (B2C) to user-centered mass customization (C2M), achieving a high-level dynamic balance between supply and demand and reducing resource misallocation and waste. Furthermore, data assets themselves can be productized and serviced, giving rise to new business models and revenue sources, such as providing data API services, industry insight reports, and data-based subscription

services. At the industrial level, the penetration and integration of data elements drive the deep digital transformation of traditional industries, empowering data-driven emerging industries such as intelligent connected vehicles, smart energy, and digital healthcare to grow stronger. Ultimately, this mechanism guides the economic structure from factor-driven to innovation-driven, promoting the entire industrial system towards high-end, intelligent, and green upgrades, serving as the core driving force for deep industrial transformation and upgrading.

4.5 Mechanism 5: Ecological Synergy and Value Network Reconstruction Mechanism

The core of the ecological synergy and value network reconstruction mechanism lies in the secure and trusted circulation of data elements to build cross-organizational innovation ecosystems and value co-creation networks, elevating competition from individual enterprises to industrial ecosystem competition. The development of new quality productivity is not the result of a single enterprise's closed efforts but relies on the vitality of the entire innovation ecosystem. The process of data assetization is accompanied by the gradual improvement of data rights confirmation, pricing, security auditing, and compliance circulation frameworks. This provides the possibility for the secure, trusted, and compliant sharing and integration of data elements on a larger scale, including among enterprises, upstream and downstream partners, peers, and even cross-industry entities. Based on shared data assets, enterprises can engage in deeper R&D cooperation (such as joint research), more efficient business collaboration (such as collaborative manufacturing), and more agile value co-creation (such as jointly building solutions). For instance, leading enterprises can open their industry data platforms to attract numerous small and medium-sized enterprises and developers, forming a "platform + ecosystem" business model that stimulates the innovation vitality of the entire ecosystem. This transforms competition from a battle between individual enterprises to a confrontation between ecological networks. An enterprise that can efficiently integrate and utilize internal and external data assets and is adept at collaborative innovation within the ecosystem will gain unprecedented networked competitive advantages and continuous evolutionary capabilities. This mechanism unlocks the value of data elements from a higher dimension and is the key to achieving systematic and holistic development of new productive forces.

5.Conclusions

This study systematically analyzes the mechanism by which data assetization affects the new quality productivity of enterprises, revealing the profound impact of data, as a new production factor, on enterprise development through five core paths. Data assetization is not merely a technical process but a systematic project involving the reconstruction of production factors, innovation in business models, and organizational transformation. The study discovers five mechanisms: optimization of credit resource allocation, intelligent decision-making and operational synergy, knowledge accumulation and transformation of R&D paradigms, demand insight and driving industrial upgrading, and ecological collaboration and value network reconstruction. These mechanisms, interrelated and progressive, jointly promote the transformation of enterprises towards a high-tech, high-efficiency, and high-quality development model from multiple dimensions, including capital supply, efficiency improvement, technological innovation, market orientation, and ecological construction.

The research finds that data assetization effectively alleviates the financing constraints of enterprises, especially small and medium-sized specialized, refined, distinctive, and innovative enterprises, by improving information asymmetry and risk pricing capabilities, providing crucial financial support for innovation and development. Moreover, by breaking down data silos and building intelligent decision-making systems, data assetization significantly enhances operational efficiency and resource allocation capabilities of cities, achieving a leap in total factor productivity. More importantly, data assetization drives a fundamental transformation in R&D paradigms, shifting from traditional trial-and-error models to data-driven and simulation-based models, accelerating technological innovation and knowledge accumulation. At the market demand level, data assetization enables enterprises to more accurately perceive and create demand, promoting industrial upgrading towards high-end and intelligent directions. Finally, by facilitating the secure circulation of data elements and ecological collaboration, data assetization helps enterprises build more open and collaborative innovation networks, moving from individual competition to ecological competition.

However, the development of data assetization still faces many challenges. Issues such as difficulty in rights confirmation, valuation, and accounting entry have not been fundamentally resolved. The data governance system and security guarantee

mechanisms still need improvement, and barriers to cross-regional and cross-industry data circulation remain. The resolution of these problems requires the joint participation and collaborative efforts of multiple stakeholders, including the government, enterprises, research institutions, and financial institutions. In the future, it is necessary to further strengthen the construction of data basic systems, improve the data asset evaluation and trading system, promote the standardized development of the data element market, and encourage enterprises to enhance their data governance capabilities and cultivate a data-driven innovation culture.

The theoretical contribution of this study lies in constructing a systematic analysis framework for the impact of data assetization on the new quality productivity of enterprises, enriching the theoretical research on data elements and productivity development. At the practical level, it provides theoretical guidance and practical paths for enterprises to advance the process of data assetization and enhance new quality productivity. Looking ahead, with the in-depth advancement of data element market-oriented allocation reforms and continuous innovation in data technology, data assetization will play an increasingly important role in cultivating new quality productivity and promoting high-quality economic development. This requires not only technological and management innovation but also institutional innovation and ecological construction, with the joint efforts of multiple parties to release the potential value of data elements and continuously inject impetus into enterprise innovation and development.

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Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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