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THE DIGITAL DIVIDE AS A NEW LAYER OF SOCIAL STRATIFICATION IN CHINA'S INNOVATION ECONOMY

ЦИФРОВИЙ РОЗРИВ ЯК НОВИЙ РІВЕНЬ СОЦІАЛЬНОЇ СТРАТИФІКАЦІЇ В ІННОВАЦІЙНІЙ ЕКОНОМІЦІ КИТАЮ

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This article analyzes the digital divide as a modern mechanism of social stratification in China's innovation-driven economy. It examines disparities in digital access, skills, and integration among urban and rural populations, different age groups, and income levels. The study identifies key dimensions of the digital divide, including access to infrastructure, digital literacy, and usage patterns, and assesses how these disparities affect social mobility and inclusive development. Empirical data on internet penetration, urban-rural differences, and demographic patterns are presented through tables and figures. Based on the analysis, several targeted strategies are proposed to address digital inequalities, including expanding rural infrastructure, enhancing digital education, promoting inclusive technology policies, and strengthening internet-based public services. The article concludes that bridging the digital divide is essential for fostering social inclusion, reducing structural inequalities, and achieving sustainable economic growth in China's rapidly digitalizing society.

Keywords: social stratification, digital divide, economic inequality, innovation economy, China, digital literacy, Internet access, social mobility, inclusive development, digital infrastructure.

У статті досліджується цифровий розрив як сучасний механізм соціальної стратифікації в умовах інноваційної економіки Китаю. На тлі стрімкої цифровізації – розвитку електронної комерції, мобільних платіжних систем, штучного інтелекту та 5G-інфраструктури – Китай демонструє вражаючі досягнення у сфері технологій. Проте ці успіхи супроводжуються новими соціальними викликами, серед яких провідне місце займає цифрова нерівність. Дослідження зосереджене на аналізі основних вимірів цифрового розриву: доступу до цифрової інфраструктури, рівня цифрової грамотності та моделей використання технологій серед різних соціальних груп. Методологія дослідження базується на аналізі актуальних статистичних даних щодо розподілу користувачів Інтернету між міськими та сільськими районами, гендерних особливостей доступу, рівня залученості до цифрових технологій серед різних вікових груп, а також на систематизації висновків попередніх емпіричних досліджень. Такий підхід дозволив комплексно оцінити взаємозв'язок між цифровою нерівністю та сучасною соціальною стратифікацією. Виявлено, що, незважаючи на загальне зростання рівня проникнення Інтернету, значні розриви за географічною, віковою та соціально-економічною ознаками зберігаються. Сільське населення, літні люди, домогосподарства з низькими доходами та мігранти стикаються з обмеженнями в доступі до цифрових ресурсів, що поглиблює їхню соціальну вразливість та обмежує можливості для підвищення соціальної мобільності в умовах цифрової економіки. У статті систематизовано результати попередніх досліджень проблеми цифрового розриву та запропоновано рекомендації щодо його подолання: розширення цифрової інфраструктури у сільській місцевості, впровадження програм цифрової освіти для вразливих категорій населення, розробка інклюзивної державної політики та стимулювання державно-приватного партнерства у сфері цифровізації. Стаття підкреслює, що ефективне подолання цифрового розриву потребує комплексного підходу, який поєднує технічні рішення з активною соціальною політикою. Забезпечення рівного доступу до цифрових можливостей є необхідною умовою для підтримки інклюзивного розвитку, зниження структурної нерівності та зміцнення соціальної єдності в умовах цифрової епохи.

Ключові слова: соціальна стратифікація, цифровий розрив, економічна нерівність, інноваційна економіка, Китай, цифрова грамотність, доступ до Інтернету, соціальна мобільність, інклюзивний розвиток, цифрова інфраструктура.

Problem statement. Over the past two decades, China has emerged as a global leader in digital transformation. From the rise of e-commerce giants such as Alibaba and JD.com to the widespread adoption of mobile payment systems, artificial intelligence, and 5G infrastructure, the country has embraced innovation at an unprecedented scale. Digitalization is now a core driver of China's economic growth, urban development, and even governance models. However, alongside these technological advancements, a new and less visible challenge has emerged: the digital divide – a gap between individuals and groups in terms of access to and proficiency with digital technologies.

While China's innovation economy has elevated millions and modernized vast areas of public life, it has also given rise to a new layer of social stratification based on digital access and competence. Rural residents, elderly populations, low-income households, and migrant workers are disproportionately affected by limited access to high-quality internet, digital education, and platform-based services. As a result, these groups face systemic barriers to participation in the digital economy, further entrenching their social and economic disadvantages.

The digital divide in China is no longer merely a technological issue – it is a socioeconomic and political phenomenon that demands critical examination. This study seeks to explore how digital inequality operates as a mechanism of stratification in China's innovation-driven society, identify its key dimensions, and assess the implications for social mobility, cohesion, and policy reform.

Analysis of recent studies and publications. In recent years, scholars have extensively examined the dimensions and consequences of digital inequality. Li Li (2022), for example, systematizes the definition, measurement and influencing factors of digital divide, constructs the global digital divide indicator system, and conducts empirical research on the 44 influencing factors of the global digital divide and the impact of the «Belt and Road» initiative on the global digital divide [2]. Hong, J., Li, R., & Yang, X. (2024) conduct an empirical investigation into the impact of the digital economy on income inequality by integrating a theoretical framework with large-scale data. Utilizing tens of millions of business registration records in conjunction with district-, county-and city-level statistical datasets, the study examines how core industries within the digital economy influence income disparities across regional and urban-rural contexts [1]. Zhou Weizheng and Li Jia (2024) conducted a study using data from 168 Chinese cities covering the period 2011 to 2019 to explore the relationship between the development of the digital economy and the pursuit of common prosperity in the context of the digital divide. Their findings offer policy-relevant insights into strategies for bridging the digital divide and leveraging digital economic growth to advance shared wealth and inclusive development [7]. Yang Yashu (2022) traces the theoretical evolution of the digital divide and examines its emerging forms within the context of the smart media era. The study also systematically analyzes the specific digital challenges encountered by the elderly, highlighting the unique aspects of their digital exclusion in an increasingly technology-driven society [10]. Yuxuan Sang analyzes the impacts of the digital divide on social justice, civic engagement, and educational rights to raise public awareness and motivate policymakers to confront and resolve issues of inequality, fostering a more equitable and diverse digital society [4].

Identification of previously unresolved parts of the overall problem. Although considerable research has been conducted, the comprehensive impact of the key dimensions of the digital divide remains insufficiently explored in the context of China's rapidly developing innovation economy. A lack of integrated approaches that simultaneously address access to digital infrastructure, levels of digital literacy, and differences in technology usage across social groups limits the understanding of how these factors collectively shape contemporary social stratification and influence opportunities for inclusive development and social mobility.

Formulation of the objectives of the article (task statement). This study aims to analyze the role of the digital divide as a contemporary mechanism of social stratification in China, within the context of its rapidly developing innovation economy. The research examines how disparities in digital access, skills, and integration shape social inequality and assesses the implications for inclusive development and upward social mobility. This goal involves the following tasks: to identify the key dimensions of the digital divide in China, including access to digital infrastructure, digital literacy, and usage patterns across different social groups; to analyze the relationship between digital inequality and broader social stratification, such as income, education, urban-rural divide, and employment

opportunities; to evaluate the impact of digital exclusion on individuals' potential for upward social mobility and their integration into the innovation-driven economy.

Summary of the main research material. A digital inequality is defined as the unequal use of digital technologies, which extends to unequal impacts and outcomes. The related concept is the digital divide, which represents the gap in the utilization and benefits of digital technologies between people, organizations, and governments. The need to close the digital divide was recognized by the UN in its 2016 announcement that the internet is a human right and that efforts to remove internet access are a violation of human rights [6]. Its importance has been evident during the COVID-19 period in the disparities between and within communities in accessing the internet for family needs, including schooling, health information, social contacts, and commercial services [3].

There is no one digital divide. At a high level, the digital divide is the gap between those with Internet access and those without it. But the digital divide is multifaceted and includes many factors such as access, affordability, quality, and relevance. As Michael Kende wrote, "the digital divide is not a binary." Here are some of the things that lead to disparities in Internet access: availability, affordability, quality of service, relevance, additional divides, for example, other areas that can create digital inequality includ security, interconnectivity, digital literacy, and access to equipment [9].

The digital constitutes a complex, multidimensional construct that is often categorized into three distinct levels:

1. The first-level digital divide refers to disparities in access to digital infrastructure, such as internet connectivity and device ownership;
2. The second-level divide concerns differences in digital skills and actual use of technologies;
3. The third-level divide reflects inequalities in the social and economic outcomes stemming from digital engagement [9].

In the Chinese context, these levels manifest in distinct yet overlapping ways, influenced by the country's dual urban-rural structure, regional economic disparities, and rapid pace of digitalization.

For example, despite China's efforts to expand broadband access nationwide, rural and western provinces still lag significantly behind coastal urban centers in both access and meaningful digital participation. Moreover, the aging population and internal migrants often face barriers not only in access but also in digital literacy and integration into digital services such as e-government, online education, and telemedicine.

These inequalities were particularly amplified during the COVID-19 pandemic, when many essential services – including health consultations, distance learning, and digital payment systems – shifted online. The ability to effectively engage with these systems became a critical factor of social inclusion, and the lack of access or skills translated directly into reduced opportunities for upward mobility and social protection.

The following table summarizes the key dimensions of the digital divide and how they are expressed across different population groups in China (Table 1).

As the table illustrates, digital inequality in China extends far beyond access to infrastructure; it intersects with long-standing socio-economic divisions and institutional structures. These layered disparities not only limit certain groups' ability to participate fully in the digital economy, but also exacerbate existing inequalities in education, employment, and public services. Addressing the digital divide, therefore, requires more than technological solutions, it demands targeted social policies that account for the diverse realities of all types of populations and promote inclusive digital development.

To complement the tabular presentation of the key dimensions of the digital divide in China, the following figure illustrates the evolution of internet usage among urban and rural populations over recent years. This visual representation highlights persistent disparities in access and engagement across geographic contexts, despite the overall growth of internet penetration nationwide (Figure 1).

As depicted in the figure, the urban-rural disparity in internet usage in China remains pronounced. Urban residents consistently accounted for over 68% of the country's internet users between 2020 and 2024, while rural users constituted less than one-third of the total. Although both segments experienced relatively stable trends, the slight decline in rural internet user share – from 31.3% in 2020 to 27.7% in 2024 – underscores a growing concern regarding equitable digital access. This divergence highlights the need for more targeted digital inclusion policies to bridge the geographic divide and ensure that rural communities are not left behind in China's digital transformation [5].

Table 1

Key dimensions of the digital divide in China

Parameter	Expression of the Digital Divide
Geography	Urban areas benefit from stable and extensive 5G coverage, while rural regions experience limited and unstable access.
Education	Elite urban schools are equipped with advanced technologies such as VR and coding labs; rural schools often rely on outdated or minimal digital infrastructure.
Age	Younger generations are digitally engaged and literate; individuals aged 60+ are often excluded from digital platforms and services.
Income	Low-income families may lack personal digital devices or home Wi-Fi, limiting access to online education, work, and services.
Hukou Status	Migrants with rural household registration (hukou) living in cities may still face restricted access to urban digital services due to institutional barriers.

Source: formed on the basis of [4; 7; 10]

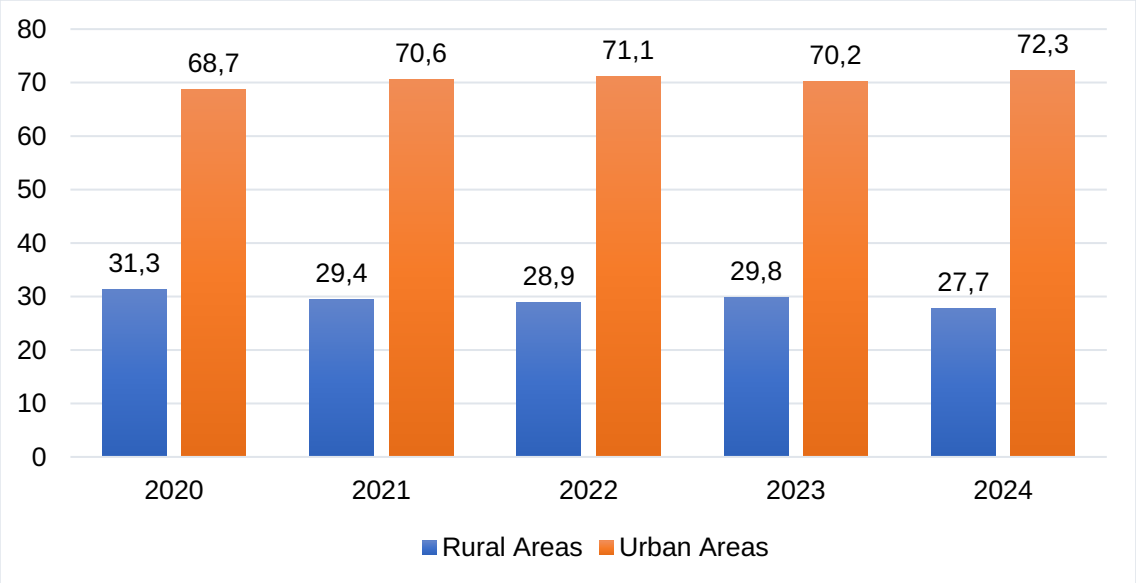

Figure 1. Urban-Rural Structure of Internet Users in China, %

Source: formed on the basis of [5]

It is worth saying that in June 2024, the Internet penetration rate in China's urban areas had risen to 85.3%, marking an increase of 1.9 percentage points compared to December 2023. In contrast, the penetration rate in rural areas declined to 63.8%, representing a decrease of 2.7 percentage points over the same period (Figure 2).

Despite different difficulties, the digital information infrastructure in rural areas has been continuously optimized and upgraded. Supported by national policies, rural regions have actively expanded 4G base station deployment, extended 5G network coverage, and constructed gigabit optical fiber networks. By 2024, universal telecommunication services had reached 204 cities and districts, supporting 4,647 4G base stations and 3,680 5G base stations. Thanks to these initiatives, remote mountainous villages have gradually eliminated signal blind spots, and the availability of strong, stable signals has significantly improved the quality of life for rural residents.

Furthermore, the efficiency of public services in rural areas has steadily increased. In the field of «Internet + Education», according to the latest data released by the Ministry of Education, internet access in primary and secondary schools (including teaching buildings) nationwide has reached 100%. Moreover, 99.9% of schools now have an export bandwidth exceeding 100 Mbps, over 75% have achieved wireless network coverage, and 99.5% are equipped with multimedia classrooms, effectively narrowing the

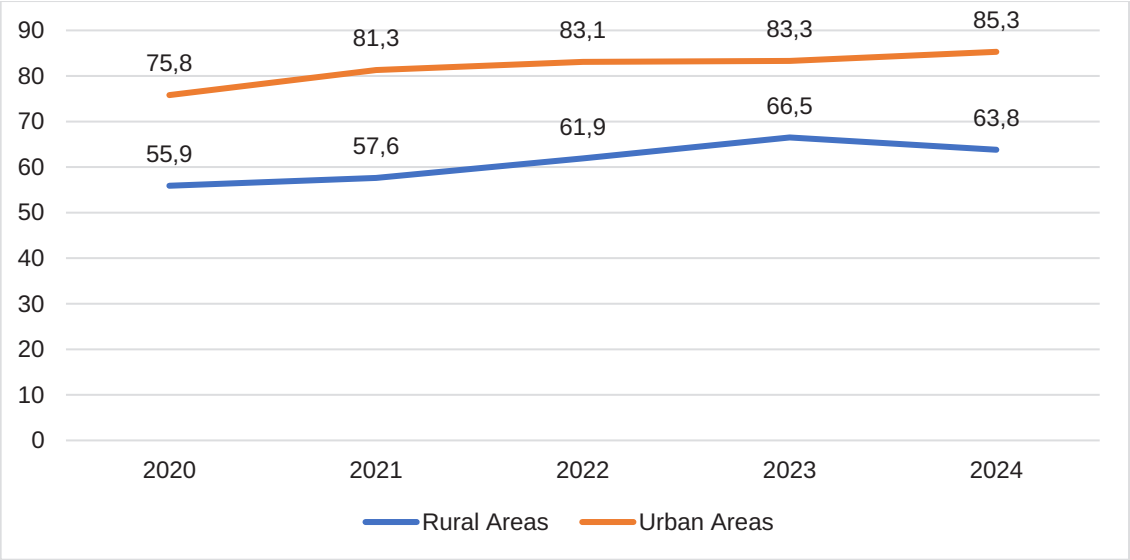

Figure 2. Internet Penetration in Rural and Urban Areas in China, %

Source: formed on the basis of [5; 8]

urban-rural educational gap [5]. Because differences in the quality of education are also a major component of the digital divide. In developed regions, high-quality educational resources are abundant and a high level of education, which is conducive to the mastery and application of digital technology. In less developed regions, educational resources are scarce and access to digital technology education is limited, which directly affects the cultivation and development of digital skills [4].

Regarding «Internet + Healthcare», the development of online remote services has enabled rural populations to access high-quality medical and health services [5].

By June 2024, the ratio of male to female Internet users in China had reached 50.8 to 49.2, closely aligning with the overall gender distribution within the national population (Figure 3).

In 2024, Internet users aged 10-19, 20-29, 30-39, and 40-49 accounted for 13.6%, 13.5%, 19.3%, and 16.7% of the total user base, respectively. Meanwhile, the proportion of Internet users aged 50 and above rose from 32.5% in December 2023 to 33.3%, reflecting

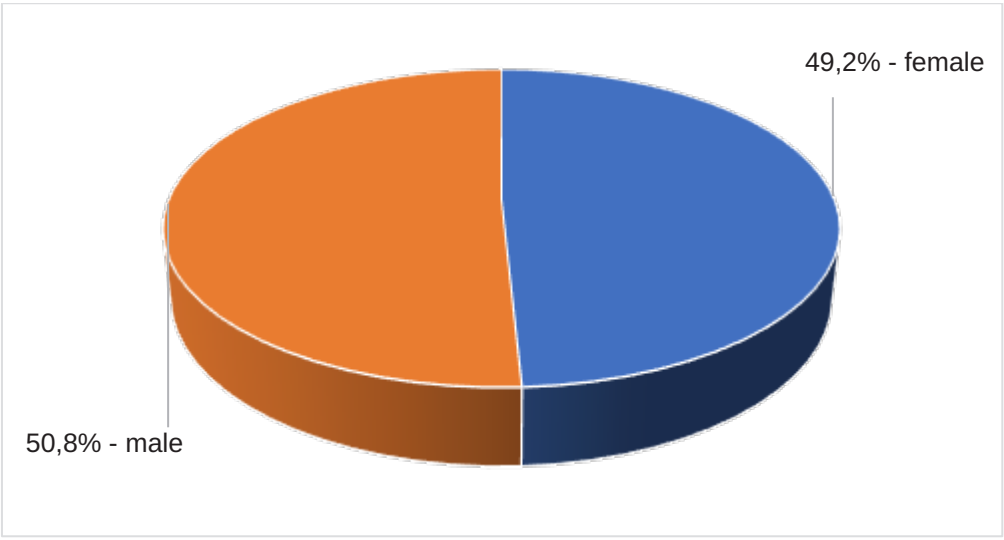

Figure 3. Gender Structure of Internet Users in China, %

Source: formed on the basis of [5]

the continued expansion of Internet adoption among middle-aged and older populations [5].

The proportion of Internet users in China accessing the Internet via mobile phones had reached 99.7%; the proportions of users accessing the Internet via desktop computers, laptops, televisions, and tablets were 34.2%, 32.4%, 25.2%, and 30.5%, respectively; the proportions of users accessing the Internet through smart connected vehicles, smart home devices, and personal wearable devices had reached 10.4%, 21.9%, and 24.2%, respectively. Among these, the number of Internet users accessing the Internet via smart connected vehicles had reached 115 million [5].

Limited digital skills significantly reduce the ability of different groups of people to seize emerging opportunities within China's innovation-driven economy. As sectors such as e-commerce, fintech, artificial intelligence, and digital healthcare rapidly expand, individuals lacking digital competence face increasing barriers to employment, entrepreneurship, and access to modern services. This digital skill gap not only restricts their immediate economic prospects but also perpetuates long-term social and regional inequalities, hindering broader goals of inclusive and sustainable development.

To address the digital divide as a barrier to inclusive development and social mobility in China, several targeted strategies are recommended:

1. Expand Rural Digital Infrastructure. Investments in high-speed internet infrastructure, particularly 5G networks and fiber optics, should be prioritized in rural and remote areas to ensure equitable access to digital resources.

2. Enhance Digital Literacy Programs. Comprehensive digital education initiatives targeting rural populations, older adults, and disadvantaged groups should be implemented to bridge skills gaps and empower effective internet use.

3. Promote Inclusive Technology Policies. Policy frameworks should emphasize equal access to digital technologies across gender and age groups, encouraging inclusive innovation ecosystems that leave no demographic behind.

4. Foster Public-Private Partnerships. Collaborations between government, private enterprises, and non-governmental organizations can accelerate digital inclusion efforts, particularly in under-resourced regions.

5. Strengthen Internet-Based Public Services. Further development of «Internet + Education» and «Internet + Healthcare» initiatives can ensure that rural and marginalized communities benefit from high-quality services, thereby reducing structural inequalities.

6. Monitor and Address Emerging Inequalities. Ongoing assessment of digital access, usage patterns, and emerging disparities is essential to adapt policies effectively and promote sustainable, inclusive economic growth.

In addition to infrastructural and educational strategies, fostering social innovation represents a crucial pathway toward narrowing the digital divide in China. Initiatives such as establishing digital community centers in underserved regions, deploying mobile internet laboratories to remote villages, and designing user-friendly applications tailored for the elderly could substantially enhance digital inclusion. These community-driven solutions not only bridge access and literacy gaps but also empower different types of populations to participate more fully in the digital economy. By promoting grassroots innovation and supporting bottom-up digital initiatives, China can cultivate a more inclusive, adaptive, and resilient digital society that leaves no group behind.

Furthermore, it is crucial to recognize the dynamic nature of the digital divide and to establish continuous monitoring mechanisms that can adapt to technological and societal changes. Digital inclusion should be integrated as a core element across all public policies, from education and healthcare to governance reforms. Moreover, promoting digital rights as fundamental human rights is essential for ensuring that no group is systematically excluded from the benefits of innovation. Only through a holistic, rights-based, and adaptable approach can China truly bridge its digital divides and foster sustainable, inclusive development.

Conclusions. Thus, this study has explored the digital divide as a contemporary mechanism of social stratification in China, emphasizing its role within the country's rapidly evolving innovation economy. Through the analysis of internet usage disparities between urban and rural populations, gender groups, and different age cohorts, the findings reveal a persistent and multifaceted digital gap that continues to shape patterns of social inequality.

Despite notable advancements in digital infrastructure and widespread internet penetration, especially in urban centers, significant challenges remain in ensuring equitable digital access for rural, older, and

socioeconomically disadvantaged groups. The urban-rural divide in internet adoption, the aging gap in digital engagement, and the nuanced gender dynamics underscore that access alone does not guarantee equal participation in the digital economy.

The increasing integration of internet technologies into education, healthcare, and everyday services presents both an opportunity and a risk: while it can drive inclusive development and upward social mobility, it can also deepen existing inequalities if systemic gaps are left unaddressed. Bridging the digital divide, therefore, is not solely a matter of technological expansion but also of policy innovation, targeted investment in digital literacy, and sustained efforts to foster inclusive digital ecosystems.

Addressing these disparities is crucial for promoting a more equitable and sustainable model of development. By ensuring that all citizens, regardless of their place of residence, age or gender, have meaningful access to digital opportunities, China can better harness the transformative power of technology to advance social inclusion, reduce structural inequalities and achieve broader economic and social resilience in the digital age.

Future research should further explore longitudinal impacts of digital stratification to better inform adaptive policy frameworks that ensure sustainable digital inclusion.

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