Big Data Era: Citizenship of New Generation Migrant Workers Obstacles and Paths to Crossing the "Digital Divide"

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Abstract. The institutional divide of the new generation of rural migrant workers' citizenship in the era of big data has evolved into the status quo of the coexistence of institutional divides and digital divides. We analyze the native digital divide of new-generation migrant workers and the lack of digital capital caused by the derived digital divide; in the context of digitization, we analyze the dilemma performance of their citizenship in terms of their lifestyles, identities, and employment differences and similarities. Citizenship of new-generation migrant workers across the digital divide needs to be carried out in combination with policy support, educational empowerment, and training to narrow the gap between new-generation migrant workers and urban citizens and to share the dividends brought about by the development of the digital economy.

Keywords: New generation of migrant workers; Digital divide; Citizenship

1 Introduction

1.1 Research background

With the rapid development of 5G, Big Data and Artificial Intelligence, China is moving towards an era of digital intelligence. Emerging technologies represented by the Internet have realized interactive integration and cooperation with various industries, constantly injecting new vitality into the industry. Similarly, all industries have been influenced and impacted by the Internet. From the perspective of social historical development, the influence and impact of the Internet is characterized by short duration and rich content. The great contrast between short duration and rich content has led to a lack of comprehensive thinking about the impact of the Internet on the citizenship of new-generation migrant workers.

In the era of digital communication, digital information resources and physical resources are the two pillars supporting social and economic development. At present, the networked allocation of digital resources is the third way of resource allocation in addition to planned resources and market-allocated resources. The sharing, virtualization and openness of digital information resources do not mean that everyone can share them equally. The access, use and supply of digital information have obvious individual differences and spatial differences. In the information society, the gap caused by the digital divide is becoming the fourth gap in

Chinese society after the "urban-rural gap", the "industrial-peasant gap" and the "brain-body gap", and will lead to more and more serious social differentiation. Society is paying more and more attention to the issue of digital equity（Liu &Liu2023）.

The new generation of migrant workers, due to their low level of education, are already at a disadvantage in terms of digital capital or even become "digital refugees" when they become part of the digital information society. At the individual level, digital capital poverty will directly hinder the citizenship of new-generation migrant workers; at the social level, digital capital poverty will become a key factor hindering the solution of the "three rural issues".

1.2 Significance of the research

Currently, at the time of the transformation of social and economic development, the digital economy is one of the important forms of China's economic development and is also necessary for realizing sustainable economic development. Solving the digital divide to accelerate the new generation of rural migrant workers' citizenship is also one of the necessary problems to be solved in China's modernization and urbanization. Therefore, analyzing the impact of the digital divide on the citizenship of the new generation of rural migrant workers, strengthening the understanding of the citizenship of the new generation of rural migrant workers, and promoting the development of urbanization will be conducive to a deeper understanding of the situation of China's social development and grasping the responsibilities of the times.

1.3 Research questions

The new generation of rural migrant workers does not follow the life cycle of "going to the city to work and returning to the hometown to work in agriculture". An increasing number of new-generation rural migrant workers have changed their mentality from "urban passers-by" to "urban subjects", with a strong desire to live in the city. However, there is a mismatch between the willingness of new-generation rural migrant workers to stay in the city and their ability to establish themselves in the city, making it difficult for them to settle in the city by relying only on their own abilities.

China's digital economy is developing rapidly, and its role in the national economy and social life is becoming increasingly important. While effectively promoting economic growth, the digital economy can increase the risk of social integration within the new generation of migrant workers, and affected by digital literacy and the digital divide, can it narrow the gap between them and urban and rural residents and promote their citizenship. This paper conducts an in-depth study on this topic.

2 Analysis of barriers to the citizenship of new-generation migrant workers in the era of digital communication

2.1 Institutional factors: the insurmountable urban–rural divide

Prior to the reform and opening up of China in 1978, China was affected by the planned economy and the dual urban–rural household registration system, revealing the status quo of the urban–rural division. With the development of marketization and industrialization, the

scale of urban–rural population mobility has gradually increased, and barriers to the urban–rural household registration system have weakened but still exist [1]. The "hidden household registration wall" formed by the various welfare benefits attached to the household registration system still excludes the new generation of rural migrant workers from the urban resource allocation system. This is, in effect, the urban–rural divide, which has made the new generation of rural migrant workers "outsiders" or "migratory birds" in cities.

2.2 The digital divide: impediments to the transition of the new generation of migrant workers to citizenship

With the advance of modernization and urbanization, it has become common for the new generation of rural migrant workers to move from the countryside into cities to work in the service sector and industry. However, due to China's unique dual urban–rural system, a new generation of migrant workers has been established. This group is more likely to transform into urban citizens due to their long-term living and working in cities, which in turn promotes urbanization. As a result of the digital divide, the new generation of migrant workers is often at the periphery of the city, making it difficult for them to truly integrate into the city.

The development of digital technology is not universal and requires a certain technological and material foundation as a guarantee. According to the social and economic development model of digitization and intelligence, individuals' offline resources will affect their online resources [2]. According to the analysis of data from the 2020 survey of 500 new-generation rural migrant workers and young urban residents in Shandong Province on Internet use, the two groups of workers showed differences in their skills and degree of use of digital technology.

Table 1. A Comparison of Differences in Internet Access and Use among New Generation Migrants

Comparison Group	Network Access Ratio	Usage Frequency				
		Learn	Work	Shop	Socialize	Entertainment
New generation of migrant workers	82.4%	3.25	3.75	3.96	6.23	6.401
Young urban residents	91.2%	4.02	5.13	4.01	6.12	6.31

Note: The Internet access ratio refers to the rate at which computers or mobile devices are used to access the Internet.
The frequency of use is rated on a scale of 1-5, from "never" to "almost every day"; the higher the score is, the greater the frequency.

As shown in Table 1, the new generation of rural migrant workers and young urban residents exhibit obvious differences in terms of their skills and degree of use of digital technology. The new generation migrant workers mainly use the Internet for entertainment and social activities, and the frequency of study and work is much lower than that of young urban residents. New-generation rural migrant workers have yet to cross the institutional divide in the context of the rapid development of digitalization and intelligence and are being impacted by a new "digital

divide", which exacerbates obstacles to the citizenship of new-generation rural migrant workers.

3 The evolution and development of the digital divide among new generation migrant workers

As the application of the Internet becomes more widespread and in depth, there is a gap between the levels of mastery of digital technology and the ability of different users to apply it. Today's new generation of migrant workers faces a "digital divide"; that is, there is a gap between the breadth and depth of their use of digital information technology and their ability to adapt to the requirements of survival and development in a digitized society.

3.1 The Impact of the Native Digital Divide on the Citizenship of New-Generation Migrant Workers

Academics have described the manifestations of the "digital divide" as having five dimensions:

If one can use the Internet, the digital literacy score will be 2; if the level 4 digital divide is based on the standard of being able to use the Internet for professional management, the digital literacy score will be 3; if the level 5 digital divide is based on the standard of being able to use the Internet to innovate, and if one can use it, the digital literacy score will be 4; if these five levels of digital divide are intuitive divisions of the new generation of rural migrant workers in contact with and use of the Internet, and the lower the score of digital literacy is, the more the level of the digital divide that needs to be crossed. The lower the digital literacy score is, the greater the extent to which the digital divide is crossed [3].

According to the 52nd Statistical Report on Internet Development in China, as of June 2023, China's Internet penetration rate reached 76.4%. The proportion of new-generation migrant workers who have access to the Internet is not low, Internet access is not limited to certain specific groups of people, and those who do not have access to the Internet are gradually marginalized. According to the data from the 2023 survey titled "Carrying out actions to improve the quality of citizenship of rural migrant workers in counties", the digital literacy value of the new generation of rural migrant workers is lower than 2, and the digital literacy value of young urban residents is greater than 3, reflecting a relatively obvious gap. According to the basic view of the native digital divide, the new generation of rural migrant workers receives much less information on the Internet than young urban residents do, which will become one of the main factors restricting the process of citizenship. In the face of the massive and complicated information available on the Internet, the new generation of rural migrant workers has low discernment ability, and they are easily influenced by negative information or the publication of unverified information, which is not conducive to the integration of their individual citizenship.

3.2 The Impact of the Derivative Digital Divide on the Citizenship of New Generation Migrant Workers

At the individual level, access to the Internet by the new generation of migrant workers does not mean that they can enjoy the dividends of digitization. Access to the Internet at the material level alone does not fundamentally eliminate the digital divide. At the regional

governance level, the widening of the digital divide will impede the digitization of public services and governance. The widening of the digital "knowledge divide" and "rights divide" between different social groups within the same region will reinforce the sense of social inequality[5], exacerbate the imbalance of regional development, and make it difficult to achieve synergistic digital governance. It will also reinforce the sense of social inequality, exacerbate the imbalance of regional development, and make it difficult to realize synergistic digital governance.

The digital divide leads to unequal digital opportunities between new-generation migrant workers and young urban residents. When new-generation migrant workers encounter difficulties in urban employment development and survival and need to seek help, they still utilize most of the traditional relationship network that extends from the rural society to the city. This kind of relationship network is a social network composed of friends, relatives and hometowns. These group members are not rich in information resources and have a high degree of repetition due to similar experiences. The new generation migrant workers live and work in the city and have frequent interactions with homogeneous groups, which solidifies their original behavioral habits, thoughts and values, slows down their convergence and transformation to urban youth in terms of behavior and consciousness, and hinders the process of their citizenship.

In addition to the traditional institutional barriers, social capital, financial capital, and human capital, the barriers to the citizenship of the new generation of rural migrant workers have also given rise to new barriers to digital competence in recent years, including the lack of digital social capital, the lack of digital human capital, and the lack of digital financial capital. The widening and deepening of the digital divide requires more capital endowments for urban citizenship.

4 The digital divide: specific manifestations of the obstacles to the democratization of the new generation of migrant workers

4.1 Manifestations of the dilemma of lifestyle integration

The new generation of rural migrant workers aspires to integrate into the city, but the digital divide, the derivative divide and the institutional divide are combined to hinder this aspiration, which is counterproductive. First, digitalization, such as self-service hospital registration and payment systems, online shopping, autonomous banking, and the networking of urban transportation information in cities, has become a part of the lives of urban dwellers. Since the New Crown Pneumonia epidemic, digital skills have become almost mandatory for urban residents to live, work and travel. The digital divide between urban and rural residents in terms of their lifestyles has widened, and the new generation of rural migrant workers, as a digitally disadvantaged group, has found it more difficult to integrate into digitized urban life, and their enjoyment of public social resources has been further squeezed by the "invisible hand" of digitization.

Second, the digital divide has a fixed effect on the differences in the cultural and entertainment life of new-generation migrant workers. Urban–rural differences make the cultural life of the new generation of rural migrant workers relatively homogeneous,

increasingly dependent on smartphones, and inclined to chat, game, overwinter short videos and other related applications. According to the results of the 2022 research and measurement, the use of new generation rural migrant workers for entertainment is greater than that of urban youth residents, but these individuals do not have the ability to operate complex devices, and the frequency of using software such as application learning on the network and work skills improvement is lower.

4.2 Individual Citizenship Identity Dilemma Performance

When an individual constructs his or her identity, the first thing he or she needs to do is to recognize the group to which he or she belongs. New-generation migrant workers entering a city not only have to adapt to urban life but also have to reconstruct their own identity; otherwise, how can they integrate into the city and become citizens?

The existence of the digital divide can exclude new-generation migrant workers from their identity in terms of social mentality, and it is also easy for new-generation migrant workers to develop a sense of social distance and deprivation. As a digitally disadvantaged group, new-generation migrant workers are often restricted in their daily work and life due to deficiencies in Internet application skills and innovation management, and the difficulty of psychological integration will increase. In the digital era, due to the limitations of personal direct experience, much of the new generation of migrant workers' perceptions of social justice come from information disclosed by online media. Biased access to information on the Internet can magnify the state of social inequality and enhance the sense of exclusion of new generation migrant workers.

4.3 Divided job market and lower incomes triggering a crisis of belonging

China's digital economy is changing rapidly, and the employment of new-generation migrant workers will become increasingly critical if the digital divide is not gradually reduced. Digitalization has led to the continuous upgrading and transformation of China's industrial structure, during which the employment chain will be disconnected from the new generation of migrant workers [6]. With China entering the aging stage, demographic dividend resources are gradually disappearing, the digital economy, digital technology and other elements of continuous restructuring and upgrading will lead to a large number of changes, such as "machine for man". In addition, traditional labor-intensive industries will gradually decline, and the new generation of rural migrant workers will gradually reduce their ability to absorb the employment of the new generation of migrant workers. Industries supported by digital information technology place greater demands on the professional skills and quality of workers [4]. It is difficult to match the professional skills, knowledge structure and experience of most new-generation migrant workers with the upgraded industrial structure.

The process of digital production, as a method of economic production with a high content of physical and human capital, replaces operative labor and creates a demand for new jobs. In the production process, the jobs eliminated and created by digital technology are not the same batch of people. The jobs created by the digital economy are at the upper end of the industrial chain (such as research and development jobs and design jobs) and at the lower end (such as after-sales jobs), and there will be a clear substitution of operational jobs (assembly jobs) in the middle. The jobs created and replaced by the digital economy differ significantly in terms

of human capital and employment skill requirements. Most of the new generation migrant workers are engaged in manufacturing and assembly positions, which are highly replaceable and subsequently face the risk of declining employment quality and poorer treatment, as well as the awkward situation of not being able to stay in the city or return to the countryside.

5 Recommended pathways

5.1 Upper the ladder: building a digital information platform

Access to the Internet is no longer a "digital divide" that needs to be bridged by new-generation rural migrant workers moving to cities; improving their digital literacy is the focus of attention. New-generation migrant workers have relatively low levels of literacy and skills to learn new knowledge , and advocacy alone will not have a significant effect. Government and nongovernmental organizations (NGOs) can provide free digital IT training to disadvantaged groups. To enhance the digital literacy of the new generation of migrant workers, the following suggestions are made: first, establish a digital information technology sharing platform supported by higher-level governments, promoted by local governments, with the participation of social organizations, and hosted by community committees in the urban communities where the new generation migrant workers gather. Second, to cross the digital divide, a digital empowerment learning platform should be provided for the new generation of rural migrant worker groups to improve their digital literacy step by step. Through the training and learning platform, the digital literacy of new-generation migrant workers will be upgraded from 1 to 2, and that of those with a digital literacy of 2 will be upgraded to 3 so that they can be upgraded step by step.

5.2 Ditch-filling project: Strengthening the informatization of basic education

Digital literacy has become essential for every citizen in today's digital society, and the deepening of the digital divide has led to the emergence of new "semilliterate" people in society. To avoid widening the digital divide, we need to fill the gap at the root, starting with rural education and starting with children. Rural compulsory education should be staffed with information technology teachers and digital information courses to fundamentally enhance digital human capital and narrow the digital divide between urban and rural areas.

5.3 Gridping Project: Integrated Urban and Rural Information Construction

The gap in public services between urban and rural areas is the soft social environment in which the digital divide for new-generation migrant workers is formed. The digital divide faced by new-generation rural migrant workers is not limited by the superficial issue of whether they can access the Internet; rather, they are able to utilize digital devices to share the social dividends brought about by the digital economy and realize the fruits of shared development. In addition, given the social divide triggered by the digital divide, it is necessary to downplay the digital fear of the new generation of rural migrant workers due to the digital divide and to avoid, as much as possible, the imbalance between the digital divide and urban residents in terms of intangible psychology and tangible wealth, which will lead to a breakdown of digitalization at the social level. Accelerating the construction of a digital mindset and actively implementing the government-promoted construction of "smart cities"

and "digital villages" will gradually ameliorate the effects of the digital divide on social inequality, social division and exclusion and prevent the digital divide from repeating itself among disadvantaged groups.

6 Conclusion

In the era of big data, the integration of the new generation of migrant workers into cities faces many obstacles, among which the issue of the digital divide is a major challenge. This obstacle is mainly reflected in two aspects: institutional factors and digital capacity. First, the institutional factors facing the integration of new-generation migrant workers into cities include social security and household registration restrictions, which constrain their citizenship process. Second, according to the viewpoint of native digital divide, new generation of migrant workers are significantly less efficient than young urban residents in terms of the amount of information they receive on the Internet and the efficiency with which they use it, which further aggravates their digital divide problem. This digital divide barrier in turn gives rise to new challenges, including the lack of digital social, human and financial capital, which limit their ability to integrate in the city. Therefore, to address the barriers to the citizenship of the new generation of migrant workers, it is necessary to overcome the digital divide problem and enhance their digital capabilities. The barriers to the citizenship of the new generation of migrant workers are also reflected in the dilemmas of lifestyle integration, the dilemmas of citizenship identity, and job market differentiation, which further exacerbate their citizenship process. Therefore, to solve these problems, it is necessary for the government, society and enterprises to work together to provide more support and resources to help the new generation of migrant workers integrate smoothly into urban life.

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