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# Theoretical framework and research prospect of the impact of China's digital economic development on population

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Against the background of social digitalization, networking, and intelligent development, the relationship between China's digital economy and regional factors is increasingly close. This study systematically cards the relevant references of the digital economy, regional factors, and population based on the six perspectives of industry, residents' income, urban human settlement environment, infrastructure, the real economy, and government management level to explore the influence of the digital economy on regional factors and regional factors on population. The results show that: 1) the digital economy has a bidirectional influence on the population. Digital economy can both attract population and lead to population outflow through relevant regional factors. 2) Digital economy can indirectly affect the spatial layout of population attributes by giving digital connotations to regional elements. We analyze the influence of China's digital economic development on the population, build the influence of the digital economy on the population research framework, and put forward the research prospect of the impact of the digital economy on the population to provide a new research perspective on digital economic geography and population, as well as provide significant reference to guide the reasonable population flow and narrow the digital divide gap.

## KEYWORDS

digital economy, population, digital divide, digital technology, China

## 1 Introduction

With the continuous development of technology, the new economy represented by the digital economy will not only reshape the world economic development pattern but also guide a new direction for the global technological revolution. At present, the development of information technology has continuously expanded the breadth and depth of the integration of the digital economy and elements of different regions and plays a vital role in stimulating consumption, driving investment, and creating jobs (Zhao et al., 2020). Due to the PM<sub>2.5</sub>, residents' income; number of per capita non-agricultural employment, per capita medical staff, and per capita primary and secondary school teachers; and other factors, China's population spatial pattern changed significantly (Liu B. et al., 2022). The population of middle and west urban China presents single

centralization, while the populations of eastern coastal cities present decentralization. The population scale of the provincial capital is expanding, while that of small and medium-sized cities is shrinking (Sun et al., 2021), and the development of the digital economy plays a positive role in urban economic growth and improvement of public service quality. Therefore, cities with rapid digital economic growth have a certain siphoning effect on the population.

Research on the digital economy domestically and abroad is still in its primary stage. It mainly includes the following aspects. First, there is an imbalance in digital economic development, based on the overall structure of economic geography, exploring the limitations of the digital economy and the imbalance in two aspects of gender and space from the social and spatial perspective (Perrons, 2004). Using the Digital Economy and Social Index (DESI) data, the time series and cluster analysis method are applied to explore the dynamic evolution and spatial agglomeration characteristics of the digital economy and social index in EU countries and to explore the polarization degree of the index from the four dimensions of connectivity, human capital, Internet services, and digital economy public services (Ryszard et al., 2021). Second, research has undertaken a dynamic evaluation of the digital economy by connecting economic growth and the construction function of information technology to reasonably predict the development trajectory of the digital economy in the information age (Akaev & Sadovnichii, 2019). The nearly 50 years of data on digital facilities, multilateral digital platforms, and users and enterprises were obtained, and the development of future companies in digital platform economics through the data were evaluated (Acs et al., 2021). Based on the World Bank's pilot evaluation program, the overall development of the digital economy in different countries was evaluated, and the current challenges of the digital economy were put forward, which mainly include the priority sequence of digital diagnostics and the need for new technology problems, to provide advice to developing countries and relevant institutions (Nagy, 2020). Third, the impact of the digital economy on other regional factors was measured by exploring the impact of the digital economy on industry (Litvinenko, 2020), environment (Sui & Rejeski, 2002), public services (Adeyinka et al., 2020), innovation and entrepreneurship (Molina-Lopez et al., 2021), infrastructure (Adriaens and Ajami, 2021), government services (Banhidi et al., 2020), the real economy (Zhang et al., 2022), residents' income (Chen et al., 2020), employment (Sun et al., 2019), and so on.

In sum, the current research domestically and abroad on the digital economy mainly focuses on its spatial characteristics and dynamic evaluation and its impact on the industry, environment, and other regional factors; however, there is a lack of research on the impact of digital economic development on population factors. The logical framework of exploring the impact of digital economic development on the population can enrich not only the relevant theories on digital economy but also

guide the orderly flow of population. Therefore, this study analyzes the logical relationship of the impact of the digital economy on population attributes from a multi-dimensional perspective by the references carding and logical inference methods, which is of great significance for the reasonable prediction of population movements, and provides a useful reference for improving the science and rationality of regional planning and reducing the digital divide gap between different regions. This manuscript comprises six sections. Section 1 is the introduction. Section 2 is the logic analysis of the impact of the digital economy on population. Section 3 is the logic analysis of the impact of the digital economy on regional factors. Section 4 is the logic analysis of the impact of regional factors on population. Section 5 is the discussion. Finally, Section 6 concludes this study. Sections 3 and 4 are used to provide evidence for the rationality of the logic of Section 2.

## 2 Logical analysis of the impact of digital economy on population

From the perspective of industrial development, the development of the digital economy is conducive to increasing the population scale and improving the structure of the population's educational level. First, the development of the digital economy promotes the digital development of industry, not only in traditional industries, but also in intelligent industries, which is conducive to increasing jobs and has a certain attraction to the surrounding population. Although the development of intelligence and digitalization makes some repetitive primary work replaceable, advanced management and other related work will not be completely replaced by artificial intelligence in a short time. Second, the development of digital technology urgently requires relevant professionals. To some extent, the introduction of high-level talents not only increases the population scale but also improves the educational level of the urban population. In addition, development of the information technology industry provides more opportunities and convenience for workers to participate in the labor market and is especially favorable for improving the employment participation rate of vulnerable workers, such as female, elderly, and rural workers. However, it is not only that the digital divide needs to be removed so that vulnerable workers can master the relevant information technology skills. According to Marxist economic theory, the mechanization of factories reduces labor intensity, includes women and children in the employment force, and expands the scope of employed and exploited groups. Under China's population aging trend, industrial digitalization (represented by the Internet of Things and artificial intelligence) lags behind the digital development of the service industry (represented by the information channel and business digital upgrading). It includes promoting the transformation of the employment of middle and low-skilled workers from the

industry to the service industry, and from the traditional industry to industries of the new economy. The mechanism consists of two parts, push and pull, as follows: Under push, industrial digitalization with high input and slow benefits faces the dual dilemma of population aging, which reduces the effective labor force, and lagging digital transformation. This means that the division of labor is not complete within the industry, and the cost transfer leads to low-quality employment and a severe loss of low-skilled industrial labor. Under pull, the degree of integration of service industry digitalization and development is high, and the profit growth of the service industry relaxes the tightness of the labor market, creates jobs in the new economy industries, and improves the quality of employment, thus promoting the employment transformation of middle and low-skilled workers to the service and new economy industries.

From the perspective of residents' income, the development of the digital economy has bidirectional characteristics for population growth. On the one hand, the development of the digital economy is conducive to further increasing the income of the residents in the local region, thus attracting a large number of people to settle and work there. On the other hand, the development of the digital economy is conducive to eliminating the digital divide gap and further narrowing the development gap between different regions. In addition, the development of information technology and networking makes online stores popular, the emergence of online shops makes practitioners' work inflexible, and some merchants move to regions with lower operating costs, which can result in the loss of population.

From the perspective of the urban human settlement environment, the development of the digital economy is conducive to optimizing the industrial structure, and digital technology can reduce the environmental pollution of enterprises. In addition, the digital economy can reduce regional carbon emissions and alleviate the urban heat island effect, thus creating a cool human settlement environment. In terms of the market environment, the digital economy can strengthen the supervision of the market environment and establish an orderly and unified market order. A comfortable and livable natural environment and a good market environment can attract population settlement, especially technological innovation talents and older adults, thus changing the educational level and age structure of the population in the region.

From the perspective of urban infrastructure, the digital economy can promote the digital development of medical, educational, and transportation facilities, and other infrastructure. Furthermore, the deep integration and development of infrastructure and digital platforms bring great convenience to residents' lives. Efficient and high-quality living conditions have a strong attraction to the population, especially older adults and school-age children, who have a strong demand for high-quality medical facilities and

educational resources. This demand often leads to family-style migration, thus changing the age structure of the regional population to a certain extent. In addition, the extensive application of digital infrastructure is also conducive to improving the digital literacy of residents.

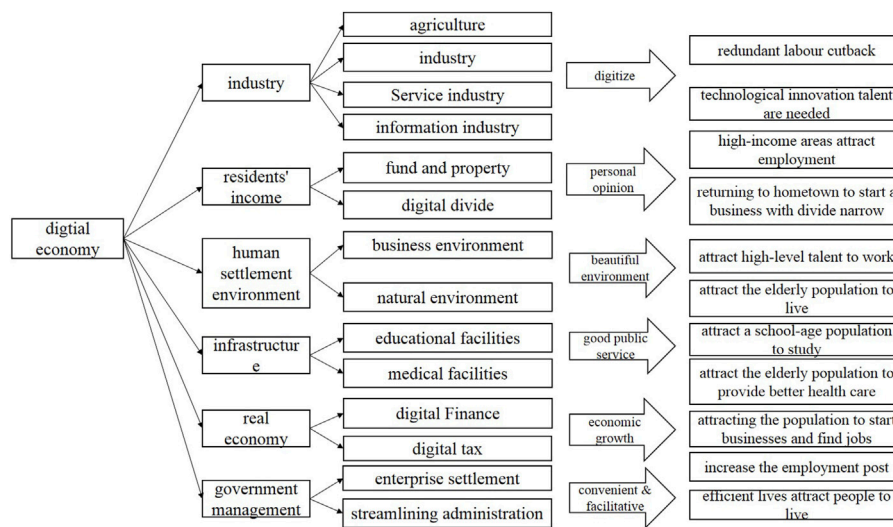
From the perspective of the real economy, the development of the digital economy is conducive to stimulating regional production and consumption and driving the development of the digital financial industry. Regions with rapid economic development also have relatively high wages; hence, they not only have good employment prospects but also have many development opportunities. Therefore, they attract a large number of migrant workers who take their families with them to work in areas with rapid economic development, thereby increasing the population in such areas.

From the perspective of the government management level, the digital economy is conducive to promoting the digital office of local government affairs, thus reducing the procedures for residents and enterprises to handle affairs. The development of the office network platform can better meet the needs of residents to handle affairs without leaving home. Efficient digital government management can not only save residents' time and improve residents' happiness but also attract the establishment of foreign enterprises. The improvement of residents' happiness and enterprise settlement can also attract a large number of migrants (Figure 1).

## 3 Logical analysis of the impact of digital economy on regional factors

### 3.1 Impact of digital economy on industry

The digital economy includes the data industry and also new products, industries, business forms, and models shaped by integrating the data industry with the economy and society. The new economic form created by the integrated development of the data industry and the first, second, third, and fourth industries has gradually become a new driving force for China's economic transformation and upgrading. The development of the digital economy promotes the upgrading of industrial structures and can provide a new development path for China's industry (Su et al., 2021). The impact of the digital economy on different industries includes the following aspects. First is the impact of the digital economy on industry. Against the backdrop of the fourth Industrial Revolution, the development of the digital economy has great potential for strengthening cooperation, data sharing, efficiency improvement, and sustainable development in the construction industry (Teisserenc & Sepasgozar, 2021). Meanwhile, the digital economy can also promote the internal and external practices of the construction industry (Li et al., 2019). The development of the digital economy is also constantly injecting new vitality into



**FIGURE 1**  
Logical diagram of the impact of the digital economy on the population.

traditional manufacturing industries, which can increase the added value of manufacturing exports and imports, and the domestic value-added rate of intermediate-product exports. Increasing investment in the digital economy has a significant positive effect on the capital-intensive and knowledge-intensive manufacturing industries (Ding et al., 2021). Additionally, the application of the digital economy to the industrial manufacturing industry is not only conducive to promoting coordination and cooperation between government, enterprise, universities, and research (Pozdneev et al., 2019) but can also extend the industrial chain of enterprises and integrate them into the world's factories (Andrea, 2020). Second is the impact of the digital economy on the leisure and entertainment industry. The application of digital technology in the hotel industry can significantly improve the network agglomeration of the population and the accessibility of digital services and expand the category of related services provided by hotels to guests (Dzhandzhugazova et al., 2018). Digital technology can also influence people's experience of enjoying music, prompting the restructuring of the music industry (Lee, 2009). From the perspective of tourism, the digital economy can continuously meet the changes in the tourism market and the personalized needs of tourists, promote the deep integration of culture and tourism, and attract professional staff engaged in the tourism industry, thus creating a large number of jobs (Samira & Alireza, 2011; Li et al., 2022). Digital technology can not only expand the physical market but also the virtual market and promote the development of the game industry (Nieborg et al., 2019). Third is the impact of the digital economy on high-tech industries. Digital economy can promote the optimization of high-tech industrial structures and the spatial agglomeration of high-tech enterprises

and can form different sizes of high-tech industrial clusters according to the development of the regional digital economy (Trofimov et al., 2021). Furthermore, the development of the digital economy has created labor demand in service industries, such as express delivery, fast-food takeout, and homemaking, creating informal jobs and improving employment structure and quality.

### 3.2 Impact of digital economy on residents' income

The "digital divide" phenomenon not only exists between regions and countries but also between different social groups and strata. The digital divide reveals the unbalanced development of digital information technology, which may cause the differentiation of residents' income levels among regions (Liu & Zhang, 2019). Strengthening the construction of the digital economy can enhance the sustainability of farmers' income generation (Sun & Liu, 2022). The Internet can connect villages and cities, achieve the information development of the industrial chain, help farmers to improve productivity, reduce costs, and increase farmers' income. In addition, the development of block chain technology also provides opportunities for "digital poverty reduction" and innovation of agricultural development, to narrow the development gap between urban and rural residents. Therefore, the digital economy can give full play to its universality and sharing, narrow the unbalanced development between urban and rural areas, and reduce the income gap between urban and rural residents (Wang & Xiao, 2021). Sometimes workers' incomes

may reduce after changes in jobs. If the management of enterprises involving dangerous occupations and heavy physical labor can replace labor with machines and artificial intelligence, these jobs will no longer need a wage supplement, and the wage gap between occupations will narrow. However, the replaced workforce needs to be reemployed, or the income gap will widen. If work supervision can be achieved using information technology, then enterprises do not need to use performance wages to motivate workers, and the wage gap will narrow, which will also help to clear the labor market and achieve full employment at the social level. The characteristic gaps between different types of work are narrowing. The learning effect of the Internet reduces the skill distance of each occupation, which is conducive to narrowing the wage gap through the mobility of the labor force between occupations.

### 3.3 Impact of digital economy on urban human settlement environment

From the perspective of urban green development, the agglomeration of the digital economy can not only alleviate regional energy consumption and environmental pollution but also optimize the industrial structure and human capital, thereby promoting the green development of the regional environment (Ren et al., 2022). In addition, the digital economy can significantly improve the regional green total factor energy efficiency by improving the level of economic growth, urbanization, and research and development (R&D) (Zhang W. et al., 2021). From the perspective of urban carbon emission, industrial, financial, and innovative digitalization are important factors for the digital economy to influence and significantly reduce urban carbon emissions, effectively alleviate the urban heat island effect, and improve the comfort of the living climate (Yang et al., 2019; Xu et al., 2022). From the perspective of the business environment, the digital economy provides a basic guarantee for the development of the business environment, and it can optimize the market business environment by improving market service levels and strengthening market supervision. In addition, the digital transformation and coordinated development of physical enterprises and e-commerce platforms are conducive to promoting the orderly flow of market factors, thus optimizing the digital business environment (Zhang S. et al., 2021).

### 3.4 Impact of digital economy on urban infrastructure

The Internet, as an important catalyst in the digital economy, aids the development of urban infrastructure transfer to the digital direction. The digital economy has broadened the number and scope of Internet users and strengthened the

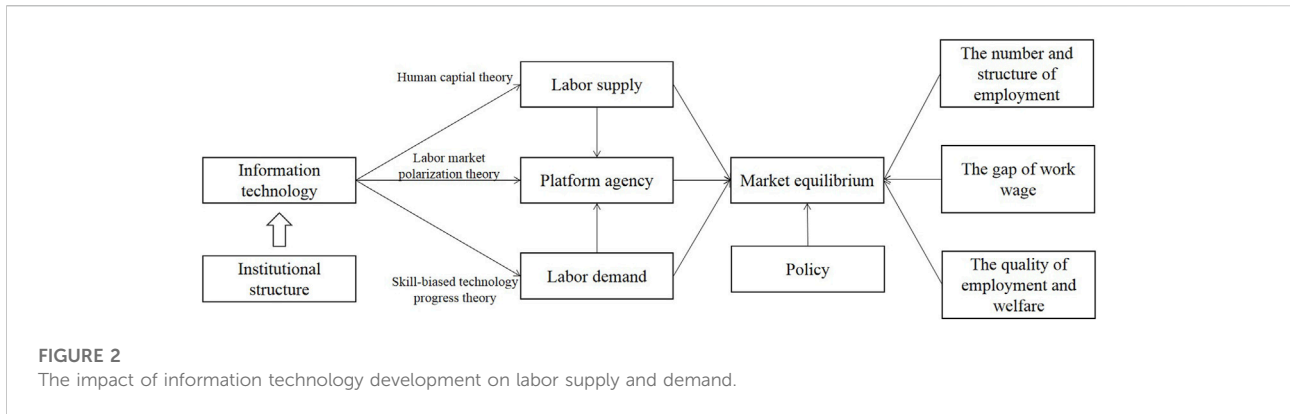
integration of business, education, and health infrastructure into a network infrastructure (Qin & Liu., 2022). It can not only promote the digital transformation of living infrastructure and improve the convenience of residents' lives but also strengthen the application of handicraft industries and other industries in digital infrastructure, thus improving the operation scale and efficiency of regional industries (Kim, 2006).

### 3.5 Impact of digital economy on real economy

As one of the main components of the digital economy, the development of digital finance can stimulate regional innovation potential and indirectly promote the development of the real economy. This phenomenon is especially significant in the central and western cities with low urbanization rates and low material capital levels (Jiang et al., 2021). The direct and spillover effects of the digital economy on the sustainable development of China's real economy are positive, and the direct effect is greater than the spillover effect (Jiao & Sun, 2021). The digital economy also has a significant spatial spillover effect on the high-quality development of the real economy; however, the influence of the spillover effect differs for each urban real economy (Ding et al., 2022). In addition, the digital economy can remotely control the operation of the production and transportation process on e-commerce platforms. Even if the city where the e-commerce platform headquarters is located does not participate in the process of production and transportation, the digital tax generated during the operation process remains in the city where the headquarters is located, thus increasing economic development.

### 3.6 Impact of digital economy on government management level

The development of the digital economy connecting enterprises, residents, and the government through the network makes government management a network and a platform (Wilson & Mergel, 2022). With the further promotion of digital government affairs, government agencies have come to conduct all kinds of business processing online. The development of the digital economy has the greatest convenience for urban residents to handle various businesses, and also reduces the cumbersome procedures required of foreign enterprises to settle and apply for a license, to meet the needs of society and enterprises (Rytova et al., 2020), and is conducive to the digital development and transfer of the government office system. During the COVID-19 pandemic, the development of the digital economy made great contributions to the government's prevention and management of the pandemic, population travel restrictions, pandemic situation statistics, and material



transportation. To some extent, the development of the digital economy represents the administrative level of cities (Wu et al., 2022).

## 4 Logical analysis of the impact of regional factors on population

### 4.1 Impact of industry on population

In the process of continuous upgrading and high-end development, the industrial structure will lead to population changes in the region. The adjustment of the urban industrial structure will attract a large number of migrants, and cross-regional flow of the labor force is particularly common. Aside from the natural flow of the labor force, many cities have promulgated various preferential policies to strengthen the introduction of professionals. The essence of this phenomenon is also a measure for local governments to deal with the pressure of industrial transformation. However, with the development of urban industries to high-end, industrial upgrading has an inhibitory effect on the scale of the urban population (Tong et al., 2021). Moreover, the spatial agglomeration characteristics of the industry and urban population have converged, and the spatial coupling relationship between the industry and population presents a gradient spatial evolution pattern (Liu et al., 2021). The development of information technology will also have an impact on human capital investment and the quality of labor supply. Some learning resources can be shared for free on the Internet, reducing the cost of human capital investment, which is conducive to improving the quality of labor supply. It is easier for workers to move and change occupations, but if labor is flowing too frequently, it is not conducive to forming long-term talented human capital in enterprises. Generally speaking, if information technology is used to replace workers, the demand for labor will decline. From the perspective of labor demand structure, the skill-biased technology progress theory posits that demand for

highly skilled labor has increased, and the demand for low-skilled labor, which is easily replaced by information technology, will decrease. The labor market polarization theory suggests that with increased demand for unconventional tasks, the demand for highly skilled and low-skilled labor increases, the demand for moderately skilled workers who engage in routine tasks is reduced (Figure 2). Therefore, it can be seen that industry is the core of population competitiveness.

### 4.2 Impact of residents' income on population

Population migration is an important stage in the mobile population, and the population's willingness to settle plays a vital role in the degree of development of the regional population. The influence factors of the mobile population's willingness to settle include individual, economic, and social characteristics; economic characteristics are the core factors affecting the urban population. Income is an important component of economic characteristics; it directly affects the quality of life of residents in the city, and people with a higher quality of life will have a stronger willingness to settle (Zhu & Chen, 2010). Income inequality and the reduction in the rural population are related (Butler et al., 2020), and this correlation is increasingly evident as cities expand (Rattso & Stokke, 2014). The impact of population migration caused by income inequality is much greater than that caused by natural mobility. Population migration caused by income inequality has the most obvious influence on the middle-class population (Laskiene et al., 2020).

### 4.3 Impact of urban human settlement environment on population

The distribution of population is uneven in space; this phenomenon is formed by the interaction of various factors,

such as a good settlement environment (Kummu et al., 2016), and the suitability of the settlement environment has a strong correlation with the population (Li & Cao, 2013). Natural factors such as air quality, vegetation coverage rate, and land use are important indicators to evaluate the urban human settlement environment, which can not only evaluate the livability of the urban natural human settlement environment but also the activities and quantity of the population (Henderson & Xia, 1997). The quality of the natural environment has an important impact on the willingness of people to settle. Studies show that for every increasing unit of the annual average PM<sub>2.5</sub> concentration in the air, the possibility of immigrant settlement decreases by 8.7% (Zhao et al., 2021).

#### 4.4 Impact of urban infrastructure on population

The coverage and accessibility of urban infrastructure services have an important impact on spatial migration between different regions (Roldán et al., 2017). Public service facilities also show a significant positive correlation with population (Shi et al., 2020); this correlation is mainly present in the influence of transportation, environment, energy, and other infrastructure on a population scale and employment structure (Lu et al., 2021). Transportation facilities determine urban residents' commuting capacity; environmental facilities and energy facilities determine the urban population carrying capacity (Kasu & Chi, 2018); medical and education facilities have a strong attraction for the older and school-age population (Buckeridge et al., 2012). Therefore, improving the quality, accessibility, and equalization of medical care and education infrastructure is important for improving the population's willingness to settle (Liu T. et al., 2022).

#### 4.5 Impact of real economy on population

The development of the urban economy can not only promote the development of industries but also increase employment opportunities and labor wages. Cities with a high level of economic development are more attractive to the population, resulting in the siphoning effect. Relevant studies show that there is an interdependent relationship between China's real economy and population, and there are spatial agglomeration characteristics between them. The eastern region of the Hu Huan Yong Line has a rapid economic development, and the population is relatively concentrated, while the western region of the Hu Huan Yong Line has slow economic development and the population is relatively dispersed (Deng et al., 2022).

#### 4.6 Impact of government management level on population

Government reforms such as streamlining administration and delegating power and the reform separating permits from business licenses not only makes it convenient for residents to handle related living matters but also simplifies the cumbersome process of enterprise establishment. Therefore, an efficient government service environment is conducive to creating a good urban business environment and attracting enterprises to settle and set up factories. A large number of businesses can create more jobs and thus attract the population of the surrounding areas. In addition, the government service hotline is an important support for construction of the smart government platform, and the public hotline can not only satisfy the residents for government service complaints but also solve the cut-throat market competition. A good government management level can improve the life efficiency of residents and the happiness index. Furthermore, the impact of information technology on government labor market supervision can protect the interests and efficiency of network workers. The high-quality government management and public service level can also be attractive to the population (Schmitt et al., 2006).

### 5 Discussion

#### 5.1 Study innovations and significance

Based on the qualitative perspective of analyzing the relationship between digital economy, regional factors, and population, and then exploring the impact of digital economic development on regional population, this study not only enriches the relevant theories of the digital economy and population but can also reasonably guide the orderly flow of different population elements by changing the development of regional factors.

This research contributes to the literature through the following two points of innovation: 1) The innovation of research thinking: there exists an inverse two-direction relation among digital economy, regional elements, and population. Digital economy can indirectly affect the population through industry, and the agglomeration of the population can also indirectly affect digital economy development through industry. At present, most studies take single factors as study objects, such as medical care (Zhang et al., 2022), education (Zhang et al., 2020; Zhang Z. et al., 2021; Zhou et al., 2021), population (Yang et al., 2021), and the environment (Yang et al., 2020; Yu et al., 2022a; Chen et al., 2022; Yang et al., 2022), or only analyze the unilateral impact of population on regional factors. There is a lack of an indirect exploration of the impact of the digital economy on population based on the digital thinking mode. 2) The innovation of research vision: existing studies mainly explore the influence of the digital economy on

the environment, economy, and other factors, and lack exploration of the impact of the digital economy on the population.

## 5.2 Countermeasures and suggestions

According to the impact of the digital economy on the population, this study proposes the following development strategies. First, improving the digital management of the regional population. This would coordinate the regional human resources efficiently and in an orderly fashion and strengthen the cross-regional government management of the mobile population. The government should establish digital population files, carry out scientific demographic statistical studies of the population, dynamically monitor the age structure of urban population and talent flow in real-time, and strengthen the coordinated management of epidemic prevention of regional population flow. In addition, the service attitude and professional quality of government hotline telephone operators should be improved, and a digital operation system of human-machine collaboration should be built to encourage the interaction between government and people and carry out services benefiting enterprises. Second, establishing a digital supervision platform for humans in a settlement environment. This would provide a basic guarantee for the construction of a high-quality human settlement environment through the launch of a digital platform for urban human settlement environment governance. It would also give full play to the digital regulation ability, inspire residents to discuss communication and make recommendations on the platform, and urge the environmental protection department to curb environmental pollution in time to improve residents for human settlement environment supervision enthusiasm and participation, achieve the “Internet + human settlement environment” digital environment management way. In addition, relying on a good ecological environment to build a livable city attracts a large number of scientific and technological talents and high-tech enterprises to the city. Third, strengthen the deep integration of digital technology and public service facilities. This would involve improving the application of digital technology in the medical service system, comprehensively promoting the “Internet + medical service,” establishing population health digital files interconnected at the national, provincial, city, and county levels, and completely preserving the digital medical footprints of residents, to ensure the refinement and convenience of residents’ medical treatment. At the same time, it should promote “Internet + education service,” strengthen the establishment of students’ digital files for personal learning, achieve the interconnection of digital files from compulsory

education to higher education, and make students’ study footprints traceable, to formulate scientific and personalized teaching plans for each student.

## 5.3 Outlook

This study explores the impact of the digital economy on the population from a qualitative perspective, but it also has some limitations. First, since the quality of urban infrastructure, government management, and other elements are difficult to quantify, this study does not analyze the correlation coefficient between the digital economy and population quantitatively, or build network model methods (Yu et al., 2022b). Second, the digital economy is a huge and complex system constituting many systems, and each system contains a large number of subsystems. Therefore, this study cannot further analyze the impact of the digital economy on the population through communication infrastructure, industrial digitalization, and other subsystems. In future, the subsystem of the digital economy will be further refined to explore the correlation coefficient of digital economy and population through quantitative ways, and then analyze the impact of the digital economy on the distribution of population.

## 6 Conclusion

This study analyzes the impact of digital economic development on the population from the six dimensions of industry, residents’ income, human settlement environment, infrastructure, the real economy, and government management, and also analyzes the relationship between digital economic development and population from a qualitative perspective. The study results are as follows:

- 1) The impact of the digital economy on the population is bidirectional. Digital economy can not only attract population inflow through the advantages of diverse industries, high income, good human settlement environment, convenient facilities and services, rapid economic development, and efficient government management but also cause population outflow in the region due to the elimination of repetitive workers. Overall, the digital economy attracts more people than encouraging population outflows.
- 2) The digital economy can indirectly affect the spatial layout of the population by giving digital connotations to regional elements. The digital economy can have an impact on population elements such as permanent population, population density, registered population, the age structure



and educational level of the population, and the number of employees in different industries. The spatial migration of the population caused by the different degrees of digital economic development in various regions results in the differences in population elements between different regions.

## Data availability statement

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

## Author contributions

Conceptualization, CZ and DZ; methodology, DZ and YC; software, DZ and YC; validation, CZ; formal analysis, CZ; writing-original draft, CZ and DZ; writing-review and editing, YC All authors have read and agreed to the published version of the manuscript.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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