



# The Impact of Infrastructure, Digital Production, E-Commerce, and Virtual Economy on Digital Economy Construction in China

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**Abstract.** With the continuous expansion of the coverage of the global digital economy industry, the application of digital technology is promoting the changes in the production methods and development modes of the real economy. New challenges in the transformation of the world economy. However, it is currently unclear what variables have an impact on the development of the digital economy. This paper gathers information on the growth of infrastructure, digital production, e-commerce, and virtual economy in various Chinese cities, analyses their contributions to the growth of the digital economy, and ultimately finds that e-commerce and digital production have a significant influence on the development of urban digital economies. In order to prevent and control digital risks, increase application awareness of the digital economy, and improve workers' overall digital literacy, this paper recommends that businesses and governments should boost the development of digital networks. By improving infrastructure, it will help the layout of e-commerce and digital production enterprises.

**Keywords:** Multiple regression analysis · Digital economy · Digital construction · Infrastructure · E-commerce · Digital production · Virtual economy

## 1 Introduction

Since the dawn of the big data age, the rise of the digital economy has profoundly altered social interactions. The digital economy is not just another industrial revolution; it is a new method of wealth production and distribution. Interconnection, intelligent knowledge, data components, and virtual assets are its defining features. According to Li (2019), Recently, the rapid growth and innovation of China's digital economy have had an impact on the development of modern economics [1].

The globe is becoming more compact, information is being transmitted more quickly, and all professions' working practices are changing as a result of network development. Humanity is entering the era of big data with the growth of the network business. The traditional economy will undoubtedly be significantly impacted by the advent of the big data era. The financial sector is seeing the emergence of network finance. Its growth presents

the traditional financial industry with both a serious test and a significant potential for growth.

After agriculture and manufacturing, the digital economy is now a significant economic development sector. The profit model of conventional businesses is challenged by the “scale economies” and “scope economies” that characterize the digital economy. The real-time connectivity between individuals, businesses, and society is fostering the growth of a more collaborative, smart, and receptive global community [2]. The development of big data economy is not only research on big data modelling, application, and management, but also an in-depth discussion on how to deal with and improve the problems brought about by big data in the traditional economy. The difference between digital economy and tradition lies in four aspects: first, the unity of planning and market. Second, the unity of consumption and market. Third, the unity of supervision and freedom. Fourth, the combination of honesty and behaviour.

With the rapid development of information technology, all kinds of data that can reflect human activities are growing explosively. The role of the digital economy in conventional industries’ modernization is crucial [3]. Now people are more and more familiar with data. The advantages of big data are becoming more and more prominent in the field of social sciences. Big data has the characteristics of large sample size, strong real-time processing ability and unstructured data, which can solve some problems that cannot be solved by traditional statistical survey data. Economic research is inevitably more closely combined with big data, and the use of big data methods to analyse problems is becoming more and more popular. Economists use the real-time characteristics of big data to establish prediction models, conduct policy impact analysis, and use big data to verify economic theories.

The steady growth of China’s financial industry is facilitated by a thorough examination of the challenges posed by the transition from a traditional economy to a digital economy. Remaining digital economy risks should be identified and avoided if at all possible.

This report includes five research questions: Question 1: What effect does the infrastructure of the digital economy have on the growth of the digital economy? Question 2: Does digital production influence the economy and the digitalisation? Question 3: has the development of e-commerce promoted the transformation from traditional economy to digital economy? Question 4: is the impact of virtual economy on digital construction significant? Question 5: can digital construction directly reflect the development of digital economy?

## **2 Research Hypothesis and Variables**

### **2.1 Hypothesis Development**

In both domestic and international digital technology markets, China has emerged as a major player [4]. Economists have created a slew of new economic forecast indicators using big data, thanks to the diverse channels, enormous information, efficient, and timely updates that big data provides. Compared with traditional data, the indicators constructed by big data have stronger economic forecasting ability. Choyonghyong (2021) believes that Google trend data has a good impact on short-term forecasts. By searching the data

on the Internet, we can explore the behaviour characteristics of users, facilitate the early detection of economic changes, establish a seasonal AR model containing Google trend variables, and predict the recent economic indicators (such as tourism destination market, car sales, consumer confidence, etc.). It is verified that the accuracy of this method is 5%~20% higher than that of the traditional method.

A further benefit of big data is the ability to perform more thorough and precise empirical study on the interactions between micro- and macroeconomic variables. It is therefore possible to verify or disprove different deductive theoretical results in existing economic theories such as Laffer Curve and Phillips' Curve; endogenous growth theory; the actual economic cycle model; etc.

However, the essence of economics can be stated as the trade-off between cost and gain, which manifests itself as optimization under restrictions. Many novel events in the digital economy can still be described by existing economic theories, according to this perspective.

Even Nevertheless, the rise of the digital economy has an impact on economic research. Because of the rapid rise of the digital economy around the world, quality economic growth is being promoted globally [5]. This higher-level economic structure has enhanced resource allocation and integration, penetration, and coordination, and has had a significant impact on the number. In addition, because of this, almost all branches of economics have been reconstructed. As we all know, digital economy will subvert traditional economics. In the next few years, digitalization will continue to change China's economy, possibly at the cost of reducing the growth rate [6].

Based on these assumptions, this article examines the relationship between digital economy-related factors, such as the following:

The first hypothesis holds that a region's digital economy infrastructure and development are positively associated. The second hypothesis holds that a region's digital economy will develop to a greater extent the higher its level of digital production. The level of network e-commerce and commercial enterprises is determined by the growth of the digital economy, according to hypothesis three. The fourth hypothesis states that the virtual economy and the digital economy are positively correlated. Although virtual economy might be seen as a subset of the digital economy, it is fundamentally a part of the latter. The fifth hypothesis states that the level of digital economy construction determines how the economy will evolve.

## 2.2 Variables Description

### 2.2.1 Infrastructure

Infrastructure is an important foundation for the construction and operation of "digital economy". Therefore, it is necessary to make a comprehensive plan in terms of supporting capacity, coverage, security and reliability of infrastructure to match the application construction of "digital economy". With the urban communication network as the cornerstone, the computing service capability as the core, and the information security as the guarantee, this paper will build around the core competitiveness of "ubiquitous network transmission capability, intensive cloud service support capability, shared technology support capability, and comprehensive security management capability", promote the

integrated construction of “intelligence, cloud, network, and terminal”, and consolidate the development foundation of “digital economy”. The infrastructure of the digital economy is very important. Only good infrastructure can ensure the development, operation and implementation of digital economy. A country with good infrastructure has more advantages in promoting emerging business models such as digital logistics and e-commerce.

### **2.2.2 Digital production**

Digital production can achieve intelligent connectivity of the production and consumption chains, as well the interconnection of consumer platforms with service providers, and matching of social resources.

In the past, the Internet was connected to information, but now the Internet of things is connected to objects. Its power, rotation, heat and speed rely on sensor industrial software and network communication equipment, which are fully applied in the production field and will be extended to the whole industrial chain. For example, the six axis automatic arm used in the automobile intelligent production line has multiple its connected to each axis, which can monitor a large amount of dynamic information and sense its running status. Digital production improves the efficiency of traditional manufacturing to some extent. The impact of the digital economy on traditional sectors varies depending on the amount of digital manufacturing capability available.

### **2.2.3 E-commerce**

E-meteoritic commerce’s rise is a classic example of the digital economy in action, as well as a by-product of the advancement of science and technology. E-commerce has changed the traditional transaction mode and promoted the transformation of traditional industries, such as traditional logistics. The popularity of e-commerce reflects the development of digital economy in a country.

### **2.2.4 Virtual Economy**

The term “fictitious economy” comes from the fictitious capital defined by Marx. In the west, this is called financial deepening, which is related to the real economy. Virtual capital can be bought and sold as commodities, and can also be used as capital appreciation.

Economists once had a very concise definition of virtual economy, that is, making money with money, such as stock speculation, currency speculation, real estate speculation, futures and so on.

### **2.2.5 Digital Construction**

Digital construction is the dependent variable of this paper. The differences among infrastructure, digital transaction, e-commerce and virtual economy will affect the final construction of digital economy. Traditional sectors will be affected in varied degrees by the building of the digital economy. Traditional industries must adapt to the digital era’s

development requirements, replace the traditional business model, constantly innovate, and gradually complete the digital building of the industry.

### 2.3 Model

The models used in this study are as follows:

$$\text{TDC} = \text{TI} + \text{TDP} + \text{TEC} + \text{TVE} + \varepsilon \quad (1)$$

where, TDC is the total digital construction, TI is the total infrastructure, TDP is total digital production, TEC is the general e-commerce, TVE is the total virtual economy.

## 3 Result

The research data and model of this study adopt multiple regression analysis method.

The five criteria indicated above and the conditions and foundations for the growth of the digital economy in various cities are used to generate effective statistics. Digital production and e-commerce are essential if the nation wants to achieve specific digital economy accomplishments or benefits. Based on the above research results, the author believes that this is because China's digital economy has made great progress in innovation and information technology application. The science and technology industry is becoming stronger and stronger, and the application of high technology is becoming more and more extensive. Since these new technologies and industries are constantly evolving, it has made it easier to integrate digital economies into traditional ones. E-commerce can reflect that the consumption habits of residents in this region are changing from traditional retail to emerging online shopping, and its essence can reflect the effectiveness of digital construction in this region. Digital production is closely related to digital construction, which is also confirmed by the research conclusion (Table 1).

## 4 Suggestion

The digital economy, which is based on data and technology, is currently thriving and plays a vital role in assisting other countries' economic growth [7]. Research has shown that digital production and e-commerce significantly influence the construction of a city's digital economy.

This paper's analysis reveals a significant positive association between the development of a region's digital economy, digital production, and e-commerce. Therefore, digital production and e-commerce are the key to influencing digital construction if a country want to accomplish particular outcomes or benefits in the sphere of digital economy. The study will analyse the evolution of China's digital economy and offer some suggestions based on the above results. Innovation and the application of information technology have advanced significantly in the digital economy of China. The technology industry is becoming stronger and the application of high technology is becoming more widespread. Integration of the digital economy into the traditional economy has been significantly aided by the constant development of these new technologies and

**Table 1.** Regression results

Model	Unstandardized B
TI	0.170 (1.519)
TDP	0.360*** (2.976)
TEC	0.238** (2.293)
TVE	0.092 (0.649)
CONS	5.198** (2.513)

Notes: t statistics are presented in parentheses. \*, \*\* and \*\*\* denote significance of thresholds at 1%, 5% and 10%, respectively.

industries. It is anticipated that business practices and technological advancements in the digital age will fundamentally alter society and the competitive environment [8].

The digital economy has entered a new period of tremendous growth. The infrastructure of the digital economy is expanding rapidly, and new sectors and business models are blossoming in this context. Traditional industries' digital transformation is accelerating layer by layer. New industries and business models are significant economic drivers, while fast development will continue to promote creative social governance models with a focus on the digital economy.

The digital economy has entered a new phase of fast growth. Particularly in emerging nations, the digital economy is expanding quickly [9]. The infrastructure of the digital economy is evolving rapidly, and new industries and business models are flourishing as a result. The progressive acceleration of the digitalization of conventional sectors. New industries and new models are the key drivers of growth, while acceleration continues to promote the innovative model of social governance focusing on the digital economy.

#### 4.1 Government

##### (1) Build a solid information network infrastructure

Strengthen institutions and infrastructure to facilitate implementation. These initiatives have had a lasting effect on the integration and growth of the traditional and digital economies. With the progression of time and the rise in productivity, the conventional governance and supervision model is no longer suitable to the new period, and the most pressing issues are becoming increasingly apparent. In the context of current economic development, information technology infrastructure needs to be continuously improved, and the adoption of relevant laws and regulations is also urgent. Efforts are being made to comply with the laws that need to be observed and the laws that need to be respected. Since information can be interconnected, we

must strengthen the supervision of network and information security, create a safe, open, and interconnected environment, let everyone give better play to their abilities in this environment, and promote the balance between information flow and information security; Through the construction of a fair and convenient information network, we can promote the development of a fair and equitable international market without discrimination.

(2) Strengthen risk prevention and control of the digital economy

To prevent and manage the dangers of the digital economy, traditional approaches and innovations should be blended. The digital economy and the old economy are interdependent. It uses the Internet and information technology to manage, implement and improve risk monitoring, early warning and response systems, identify potential risks as soon as possible, predict and coordinate response to a series of risks, realize early and pilot implementation, and identify problems that need to be corrected and supervised as soon as possible by promoting the innovation of technology and business model, Formulate policies and programs according to local conditions.

(3) It is possible that the government may help to speed up the creation of new e-commerce business models, including live, social, and cross-border e-commerce, which could help to generate new competitive advantages in the digital economy and support high-quality digital economy development. Growth in the digital economy is predicted.

## 4.2 Enterprise

(1) Enhance the application awareness of the digital economy

In this setting, businesses should expand their awareness of the digital economy, adapt to the needs of the nation, increase their level of development, and enhance their capacity for innovation. As the digital economy continues to flourish, it is imperative that businesses keep up with the times and adapt to change. Businesses should think about how the convergence of the digital and traditional economies will affect production and operations, and they should learn more about how the digital economy works.

(2) Comprehensively improve workers' digital literacy

The expansion of the digital world is continuing. We should keep in mind the concept of "strengthening the country with talents", pay attention to the comprehensive quality of subordinate employees in all aspects, improve the overall quality of employees, pay attention to the digital skill training of employees, and let employees understand the integrated development of digital economy and enterprises. Employees should work more precisely and effectively, and genuinely feel the convergence of the digital and conventional economies. Enhance one's digital abilities and knowledge of the digital economy, as well as one's overall personal quality and capacity.

## 5 Conclusion

This paper's research demonstrates that there is a correlation between the growth of digital economy and digital construction in a region. Therefore, digital construction is the key to achieving specific accomplishments or benefits in the realm of digital economy. A country's infrastructure, e-commerce, digital production and virtual economy will affect digital construction. This article concludes, based on the above findings, that China's digital economy has made significant advances in innovation and information technology application. The science and technology industry is becoming stronger and stronger, and the application of high and new technology is becoming more and more extensive. Since these new technologies and industries are constantly evolving, it has made it easier to integrate digital economies into traditional ones. There has been a tremendous rise in the importance of the digitalization of the global economy and international trade [10].

The phrase "digital economy" is used to describe the creation, distribution, and consumption of digital and digital products and services. E-commerce is the method by which digital and digital products are distributed and consumed. Customization, digitisation, and networking of industrial systems are all being aided by e-commerce. Research shows that digital production and e-commerce are the cornerstone of the digital economy hypothesis using multiple regression analysis. The digital economy cannot flourish without e-commerce, which is its most important component and a key stepping stone.

The criterion for the successful integration of Finance and digital technology with the actual economy is whether it promotes productivity growth. Excessive financialization, for instance, cannot increase productivity; it does not generate income, but rather redistributes social wealth. Regarding productivity norms, we should take into account the rapid rise of the digital real economy in certain sectors (such as production and distribution). Deep integration of the digital economy and real economy in these fields is characterized by the direct participation of digital technology in the process of the real economy, heavy assets, a high employment rate, an optimized supply chain layout, significantly increased productivity, and a strong competitive advantage. In recent years, the rise of the digital economy has been cantered on industries that primarily service individuals, such as retail and wholesale, social media, and other industries. Alternatively, the emphasis has always been on how things reach customers after production. The next phase is to progressively transfer attention to the manufacturing process. If the digitalization of the consumer and distribution sector is a prologue, then the digitalization of the production sector represents the pinnacle of the growth of the digital economy, which will considerably enhance the quality, efficiency, and sustainability of the real economy.

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