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Influencing Factors of Blockchain on the High-quality Development of Digital City Economy

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Abstract: In order to solve the problem of digital city economic development, the research on the high-quality development of digital city economy becomes more meaningful. This article aims to study the influencing factors of blockchain on the high-quality economic development of digital cities. Combining the two, use the entropy method to measure economic quality under blockchain technology, and study the factors affecting economic quality. This article also uses Marx's social reproduction theory and endogenous growth theory, based on the four links of Marx's social production, closely integrating the development of digital cities, and focusing on the two basic points of digital city economic quality and influencing factors, to study how to use new economic kinetic energy to realize high-quality economic development. The experimental results of this paper show that the salary of urban residents has reached 2.61 times that of rural residents, which promotes the accumulation of rural residents who collect advanced websites.

1. Introduction

Currently, digital cities are facing many economic quality development problems under the background of the new normal. First, from a production perspective, the total factor productivity of digital cities is not high. Although digital cities are rich in resources, their economic development is low, and their resource use efficiency is lower than in the central and eastern regions. Secondly, from the perspective of distribution, the urban-rural income gap in digital cities is relatively large. China's digital city has a huge rural population base. The past development was basically based on prioritizing the development of cities, resulting in a larger urban-rural distribution contradiction; again, from the perspective of exchange, the total amount of trade is unequal and the product structure is generally low-end in the world. Although the total trade volume between digital cities and neighboring countries has maintained a surplus for a long time, the level of trade products is at the low end of the world, which also exposes the weakness of the digital city's manufacturing industry. Finally, from the perspective of consumption, consumption the unreasonable structure is still the main problem that restricts local consumption from driving the high-quality development of the regional economy.

There are many applications of blockchain. This article is about applying blockchain to the high-quality economic development of digital cities. The following people all have their own views

on this. Nishiura S proposed that the blockchain is a distributed ledger that runs in a peer-to-peer network. If reliable and stable, it can provide a new, cost-effective way to record transactions and asset ownership, model the blockchain as a random game, and analyze the equilibrium strategies of rational and strategic miners. It can be concluded that mining the longest chain is a Markov perfect equilibrium, and there is no bifurcation on the equilibrium path, which is in line with the pioneering vision. However, the blockchain game is a coordination game that opens up space for multiple equilibriums. There is a balance of forks, which leads to isolated blocks, and may also lead to continued divergence between different chains. Although he believes that the blockchain can dig out a perfect equilibrium, this equilibrium cannot be changed due to the actual situation and cannot be a true equilibrium [1]. Wook used high-quality administrative microdata from 2011 to 2013 to compare the creative economy of the United States and the United Kingdom. Creative industries in both countries are highly urbanized. However, there are important differences in the scale, density and diversity of creative activities between the two countries, which reflect the differences in urban systems and industrial organization. By testing the "creative trident" method in a comparative international context, the analysis adds to the literature on the definition and classification of the creative economy, and discusses regional economic development through the creative economy. Although he used the creative economy to discuss regional economic development. But it should be combined with reality. Every city and every country has its own characteristics. Obviously his method is not applicable to other cities in other countries [2-3].

2. Blockchain

Blockchain is the basic supporting technology of the encrypted digital currency system represented by Bitcoin [4]. Blockchain technology combines distributed data storage, point-to-point transmission, consensus mechanism, encryption algorithm and other computer technologies to construct a new application mode [5].

Blockchain (Blockchain) is a distributed database, the data stored in it is combined into related data blocks through a cryptographic algorithm; the nodes in the blockchain system are connected through P2P (Peer to Peer, peer-to-peer network), There is no central node in the system, and it has the characteristics of equality and autonomy [6]. Blockchain has four basic characteristics: decentralization, non-tampering, collective maintenance, and openness and transparency. The ideal blockchain system does not have an authoritative control agency, and all nodes follow the principle of "code is the law" to achieve freely scalable and highly available system functions. But in reality, the technology is still immature, and technical bugs and social engineering issues limit the realization of complete decentralization. A decentralized system requires nodes from different interest backgrounds to collectively maintain the operation of the system. The non-tamperable data structure becomes the basis of cooperation between nodes. All data disclosure makes it possible for different nodes to maintain the same state, ensuring a distributed system Consistency. Researchers have proposed a blockchain architecture model, which divides the blockchain system into seven different levels. The system can be subdivided into: data layer, network layer, consensus layer, incentive layer, and contract based on functional dependencies. Layer and application layer [7]. The total trade volume between cities and villages is not equal. The functions of different levels are not isolated. For example, many consensus mechanisms need to cooperate with the reasonable allocation mechanism of the incentive layer to play a role, and the design of the contract layer should consider the underlying structure of the system. The data layer includes blockchain data storage and security related technologies, block structure. A single block is divided into a block header and a block body. The parent block summary in the block header ensures data integrity; the timestamp helps the system to increase the record of the time dimension, providing traceability and

proof of existence [8]. Public key passwords are generally used for authentication of user accounts and transactions. The network layer determines the system networking mode, data dissemination and verification mode, and each node in the P2P network has to undertake all the routing, verification and forwarding work. The consensus layer solves the consistency problem of distributed systems. At present, many different consensus mechanisms have been developed for different blockchain architectures and application scenarios. Credit decentralization needs to attract a large number of nodes to participate in it. Participants in the system are assumed to be self-interested. Reasonable benefits can make the participants' personal interests consistent with system maintenance goals and maintain the healthy operation of the system. The contract layer runs operating scripts and provides the basis for transaction automation [9].

3. Experiment on the Influencing Factors of Blockchain on the High-Quality Economic Development of Digital Cities

3.1 Subjects

This data is selected from the statistical yearbooks of Guangxi Province, Hubei Province and Jiangsu Province from 2002 to 2017, and the National Economic Development Bulletin of each region in 2018.

Table 1: Specific measurement methods of three-level indicators

Three-level indicators	Measurement method
TFP	Malmquist model
Technical efficiency changes	
Technological changes	
Capital productivity	Real GDP/Capital Stock
Labor productivity	Actual regional GDP/number of employees in the region
Industrialization rate	Employment in non-agricultural industries/total employment
Comparative labor productivity in the primary industry	Proportion of primary industry output value/proportion of primary industry employment
Comparative labor productivity in the secondary industry	Proportion of secondary industry output value/proportion of secondary industry employment
Comparative labor productivity in the tertiary industry	Proportion of tertiary industry output value/proportion of tertiary industry employment
Investment rate	Fixed capital investment/actual gross regional product
Consumption rate	Total retail sales of consumer goods/actual GDP
Deposit rate	Deposit balance/actual GDP
Loan rate	Loan balance/actual GDP

As shown in Table 1, it is the specific three-level indicator measurement method in the economic quality system. In the part of economic growth efficiency, based on the actual regional gross national product as output variables, labor input and capital stock as input variables, the Malmquist model with constant returns to scale is used to measure total factor productivity, technical efficiency changes, and technology in technical efficiency.

3.2 Experimental Method

(1) Qualitative analysis combined with quantitative analysis: qualitatively analyze the current status of the traditional economic growth and economic quality of digital cities, and quantitatively analyze the factors that influence the current traditional economic growth and economic quality of digital cities.Qualitative analysis and quantitative analysis are concepts in the original analytical chemistry. Qualitative analysis is to identify what elements, ions or functional groups are contained in a substance, but not to determine its content. Quantitative analysis is to determine the content of various components in a substance. There are three types: gravimetric analysis, volumetric analysis and instrumental analysis. In the broad sense of research, qualitative analysis extends to studying things from the qualitative aspect, that is, grasping the qualitative stipulation of things from their constituent elements and their interrelations. Qualitative analysis should be based on a large number of first-hand materials, using the form of dialectical logic and logical thinking methods, analyzing and synthesizing through induction, deduction and comparison, so as to grasp the attributes and characteristics of things. Quantitative analysis is an important method in social science research. Quantitative analysis extends to the method of grasping the quality of things from quantitative analysis by mathematical methods.

(2) Theoretical model derivation and model construction: This paper uses blockchain technology to build an economic quality system under the framework of new development concepts, and uses entropy to measure economic quality. This paper establishes multiple regression model to study the influencing factors of economic quality.

(3) Theoretical research combined with empirical research: This paper, the regional difference of economic quality is studied theoretically, and the influencing factors of economic quality are studied empirically.

3.3 Experimental Process

As shown in Figure 1, qualitative and quantitative analysis of the digital city is first carried out, combined with blockchain technology to construct an economic quality system, and the economic quality is measured by the entropy method, and then a multiple regression model is constructed to study the impact of economic quality Factors, after renting, conduct theoretical research on regional differences in economic quality, conduct empirical research on factors affecting the high-quality development of digital city economics, and finally draw conclusions.

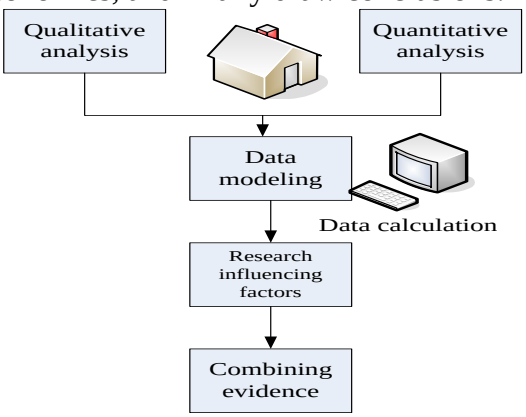

Figure 1: Experimental flowchart

4. Influencing Factors of Blockchain on the High-Quality Economic Development of Digital Cities

4.1 Blockchain Horizontal and Vertical Comparative Analysis

Economic quality is used to measure the comprehensive economic development level of a region or country. At present, China still does not have a unified standard. Therefore, this article uses blockchain technology to construct an economic quality system and entropy method for measurement, and at the same time, target indicators and first-level indicators Show it off. Target indicators are used as a unified standard to measure the country. The first level index is to measure the city.

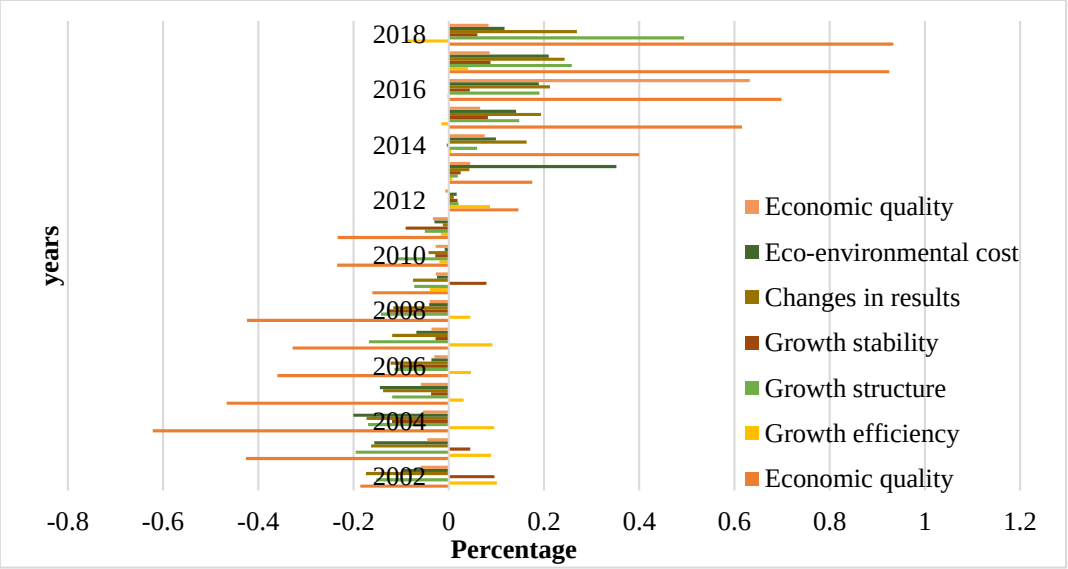

Figure 2: Economic Quality and Sub-indices of Digital City

As shown in Figure 2, the economic quality development of digital cities from 2002 to 2018 has gone through three stages. 2002-2004 was the first stage of digital city economic quality development. Due to the impact of economic growth fluctuations, irrational economic growth structure and deterioration of the ecological environment, the economic quality of digital cities showed a high-slope decline, with an average annual decline during the period. The speed reached 0.218; 2004-2016 was the second stage of the economic quality development of digital cities, showing a rapid rise in the “fluctuation”. This "volatility" appeared during 2007-2010, and it is mainly divided into three stages: decline (2007-2008)-rise (2008-2009)-decline (2009-2010) to stability. 2017-2018 is the third stage of the economic quality development of digital cities. Due to the rapid optimization of the economic structure, welfare changes and the gradual improvement in the distribution of results, the economic quality of digital cities has shown a steady and slowly rising trend.

As shown in Figure 3, from a horizontal comparison, the overall economic quality of the three regions has shown an upward trend over time. From 2002 to 2018, the economic quality levels of Guangxi, Hubei, and Jiangsu increased by 1.1193, 1.1109, and 1.4009, with an average annual growth rate of 0.658, 0.0653, and 0.0824, respectively. Guangxi ranked second with a small gap advantage. From the perspective of quality gap, the economic quality ratio of Guangxi, Hubei and Jiangsu has changed from 1:1.5:3.6 in 2002 to 1:0.9:0.8 in 2018, indicating that Guangxi has achieved a transition from a negative gap to a positive gap.

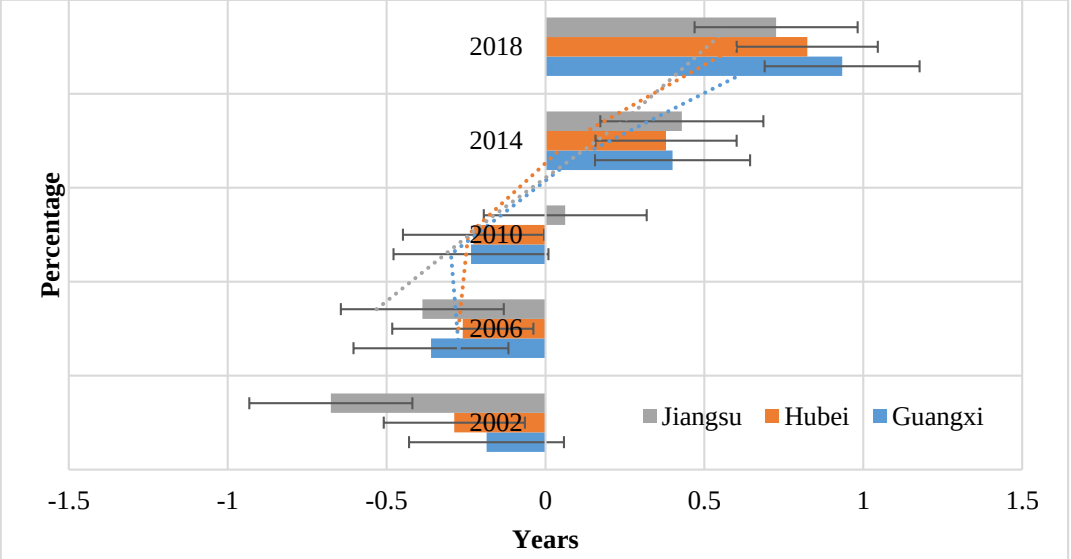

Figure 3: Trends of economic quality in Guangxi, Hubei and Jiangsu

4.2 Imbalance in the Production Sector

The weak industrial foundation of digital cities has caused local companies in cities to face severe international competition. In Qingyang, Gansu Province, digital city has a huge rural population base. Foreign investment with comparative advantages (mainly through investment and construction of factories) seizes the local market, making it difficult for already weak local companies to survive. Disadvantaged local companies are unable to continue their industrial upgrades, and in the end they can only stay in the low-end market or withdraw from the market forever. Table 2. Digital city indicators are obtained from the 2018 White Paper on Digital Economy Index of China City

Table 2: 2015-2018 Digital City Indicators by Industry Division

years	Above-scale industries	high-tech enterprises	Six energy-intensive companies	Industrial output	High-tech industry output value	Output value of six high energy-consuming industries
2015	5517	336	1732	2.44	1960.45	8543.22
2016	5463	344	1720	24466.89	2317.01	9089.68
2017	5721	357	1718	26251.18	3578.54	9783.59
2018	6054	340	1807	———	———	———

As shown in Table 2, the industrial development of digital cities is slow and the stamina is insufficient. From 2015 to 2018, although the number of factories above designated size in digital cities has increased overall, the growth rate has been slow. In 2017, industries above designated size lag far behind the representative regions of central and eastern China. First, enterprises don't know enough, have more concerns, and are reluctant to invest. Second, the informatization foundation of small and medium-sized enterprises is weak, and most enterprises lack basic underlying data, which restricts the digital transformation of enterprises. Third, some projects are technically difficult, with a large amount of investment and financial pressure. The fourth is the lack of big data talents.

Table 3: 2015-2018 technological progress and government education expenditure indicators

Years	2015	2016	2017	2018
Capital productivity	0.1860	0.1713	0.1615	0.1394
Growth rate	——	-7.85%	-5.72%	-13.68%
skill improved	0.9286	0.935	0.9614	0.8701
Growth rate	——	0.67%	2.82%	-9.48%
Government expenditure on education	0.1941	0.1923	0.1874	0.1754
Growth rate	——	-0.94%	-2.55%	-6.37%
Science and technology expenditure intensity	0.0123	0.0103	0.0122	0.0119
Growth rate	——	-16.64%	20.21%	-2.48%

As shown in Table 3, the digital city's expenditure on education and technology is still low, and the digital city's support for technology and education is gradually weakening. As technological progress and the accumulation of human capital require long-term investment in order to obtain a certain return, there is no high return in the capital market in the short term, and in recent years, the financial tightening has caused the digital city to gradually decline in support for the three technologies and education. Since 2015-2018, the level of education and science and technology expenditures in digital cities has declined, which has negatively affected its social and technological progress indicators. In the same year, it showed a negative growth of 9.5%. The paper uses two data of urban growth rate and GDP per capita from 2002 to 2018 for research.

Table 4: 2015-2018 economic growth stability and national economic quality indicators

years	2015	2016	2017	2018
Stable growth rate of economic	0.0820	0.0454	0.0876	0.06
Growth rate	——	-44.56%	92.81%	-31.65%
National conomic quality	0.0661	0.0632	0.085	0.083
Growth rate	——	-4.27%	35.70%	-2.31%
Highway mileage	11.7992	12.0546	12.3258	12.53
Growth rate	——	2.15%	2.24%	1.72%
Proportion of administrative expenses	0.0971	0.1014	0.0927	0.0997
Growth rate	——	4.37%	-8.58%	7.73%

As shown in Table 4, in terms of the stability of economic growth, digital cities are not sensitive to economic macro-control, lack a keen judgment on the market economic cycle, and fail to carry out reasonable interventions in a timely manner, leading to economic stability from 2016 to 2018 Inverted "U"-shaped fluctuations; in terms of the quality of the national economy, due to the weak and lagging speed of highway infrastructure construction, and the overall increase in government costs, construction, science and technology are gradually weakened.

4.3 Blockchain Economic Quality Results

Table 5: Moran'I Results of Economic Quality

years	2002	2003	2004	2005	2006	2007	2008	2009	2010
Moran'I	0.23**	0.107*	-0.102	0.092*	0.006	-0.022	-0.192	-0.072	-0.052
Z statistics	2.194	1.337	-0.175	1.632	0.593	0.405	-1.091	0.015	0.175
years	2011	2012	2013	2014	2015	2016	2017	2018	2019
Moran'I	-0.216	0.004	-0.224	-0.249*	-0.183	-0.085	-0.190	-0.227	—
Z statistics	-1.101	0.575	-1.248	-1.283	-0.724	-0.065	-0.807	-1.022	—

Note: *, **, and *** indicate significant at the levels of 10%, 5%, and 1% respectively, that is, they pass the test and have spatial correlation.

As shown in Table 5, testing whether economic quality has spatial correlation is the key to determining the spatial measurement model. This article uses Moran'I test. Except for the spatial correlation of economic quality in 2002-2003, 2005 and 2014, there is basically no significant spatial correlation in the economic quality of digital cities in other years. The degree of development of the linkage between the two is relatively weak, and the spatial measurement model cannot be used to regress the above data. Therefore, the following uses the traditional measurement model to process the original data.

4.4 Analysis of unfair distribution factors affecting production

Table 6: Disposable income of digital cities and urban and rural areas nationwide

area	Qingyang City			Nationwide		
Years	Disposable income of urban residents	Disposable income of rural residents	Urban-rural income gap	Disposable income of urban residents	Disposable income of rural residents	Urban-rural income gap
2015	26415	9465	2.78	31194.7	11421.6	2.730
2016	28323	10358	2.732	33615.2	12363.2	2.716
2017	30501	11324	2.689	36396.1	13422.3	2.706
2018	32435	12425	2.607	39248	14614	2.684

As shown in Table 6, although the urban-rural income gap in digital cities has been decreasing year by year and has been lower than the national level since 2017, the urban-rural income gap is still high. The income gap between urban and rural areas refers to the difference in the amount of income earned by residents in a certain period (usually one year). In 2018, the income of urban residents in digital cities has reached 2.61 times that of rural residents. The excessively high urban-rural income gap has increased the psychology of the discount rate of educational benefits of rural residents, and rural residents have higher expectations of work than education. In addition, the digital city's weaker expenditure on education means that there is less support for each educated individual. As a result, the level of human capital accumulation of rural residents in digital cities is very low, which lags behind the economic quality of digital cities.

As shown in Table 7, in the per capita consumption expenditure of urban residents in digital cities, the proportion of per capita consumption of housing, transportation and communication, education, culture and entertainment, and medical care to total consumption expenditure has increased from 22.24%, 13.78%, 11.3%, and 5.31% in 2015 to 21.01%, 14.4%, 12.24%, 8.43% in 2018; the proportion of rural per capita consumption of the above projects from 22.82%, 10.84%, 11.11%, 9.36% in 2015 to 23.26%, 14.39%, 11.75%, 10.25%. From the above, it can be clearly seen that the disposable income of digital cities and urban and rural residents in China is slowly

increasing.

Table 7: Disposable income of digital cities and urban and rural areas nationwide

category	Urban people				Rural people			
Years	2015	2016	2017	2018	2015	2016	2017	2018
expenditures	16320	17267	18358	20158	7581	8352	9436	10615
Food, tobacco and alcohol	5611	5938	6087	6181	2682	2881	3045	3196
clothes	847	887	904	962	238	251	286	325
live	3628	3781	3884	4235	1725	1902	2121	2465
Daily necessities and services	953	1023	1092	1253	456	456	495	603
Traffic communication	2250	2261	2606	2901	821	971	1283	1529
Education, Culture and Entertainment	1846	2002	2153	2465	841	1002	1127	1257
medical insurance	856	1065	1253	1689	711	783	932	1082
Other supplies	324	296	352	451	105	104	146	158

5. Conclusion

Based on many economic developments, this article uses theories and quantitative empirical methods such as economic growth, social reproduction, and high-quality economic development to influence the digital city's "economic growth and quality status", "economic growth and quality differences", and "influence on economic high-quality. The three major issues of development factors are studied, and then combined with blockchain technology, the problems found in the research are analyzed in conjunction with the local actual situation, and finally, based on the analysis results, suggestions for promoting the high-quality development of the digital city economy are put forward. The following are the main conclusions of this paper, in terms of analyzing the economic quality of digital cities. Therefore, in the future research, we should study the economic quality of digital cities in both depth and breadth. This paper uses the data from 2002 to 2018 to conduct research from two aspects: vertical and horizontal. From a vertical perspective, the economic growth rate of digital cities has slowed down year by year in recent years, and the quality level has gradually leveled off. From a horizontal perspective, the per capita GDP of digital cities is at the bottom of the double-speed, and the economic growth momentum is insufficient. And empirically found that opening to the outside world promotes high-quality economic development. Although a comprehensive research on the economic quality of digital cities has been conducted based on the blockchain, but limited by my lack of theoretical and empirical research capabilities, the depth of research on related issues is still insufficient. Digital city is of great significance to the nationwide urban construction, which can help the national cities to develop with high quality

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