

Urban Computing Infrastructure and the Integration of Digitalisation and Green Development in Enterprises

Linlin Ye

*Institute of International Education, Jilin University of Finance and Economics, Changchun, China
y19932220755@qq.com*

Abstract. One of the main problems of the digital economy in recent years is how to achieve the combined development of digitalisation and green transformation in enterprises. Based on the data of Chinese A-share listed companies, this paper will systematically study the impact, transmission mechanism and heterogeneity of urban computing infrastructure on enterprise integration in digital and green development over time using a time-fixed-effects model. Based on the above results, it can be concluded that the urban computing infrastructure has a positive effect on enterprises' integration of digital and green development, and this effect is robust to all kinds of sensitivity tests, such as adding control variables, changing the sample period, modifying standard errors, lagging explanatory variables and including industry fixed effects. Based on the analysis of the mechanism, the computing infrastructure will reduce financing constraints, promote the integration of industry and increase real-economy industrial upgrading and enterprise innovation. Based on the test of heterogeneity, the positive effect is relatively strong for non-state-owned enterprises and in non-competitive industries. This paper provides empirical evidence on the use of computing infrastructure for digital-green development in enterprises and offers policy recommendations to help the government tackle the problem of carbon emissions from infrastructure construction by means of differentiated policies.

Keywords: Urban computing infrastructure, integration of digital and green development, financing constraints, real-number industrial upgrading, enterprise innovation

1. Introduction

In recent years, the urban computing infrastructure for the development of the digital economy has begun to include data centres and intelligent computing centres. With the rapid development of this infrastructure, a serious paradox has arisen: Although it is the "core" of the digital economy, it has also become an energy-intensive "beast" that is used to promote technological progress and to provide high-energy-consumption facilities. A serious theoretical problem has arisen: Given the trends of digitalisation and green transformation, how will the construction of urban computing facilities be developed, and what will be its effect on micro-enterprises?

Unfortunately, no one has been able to answer this question yet. On the one hand, most of the previous studies have focused on the single-direction construction of computing infrastructure for digital transformation, industrial technology integration, etc., and have paid less attention to the

potential negative drag caused by large-scale energy consumption and carbon emissions during operation. At the same time, research on the reasons for enterprise digital-green integration is also very scarce. Most of the previous studies have focused on the results of such integration and have not explored what makes enterprises want to integrate. No research has been conducted on this problem yet, and therefore it is unknown how the urban computing infrastructure will affect the digital-green transformation of enterprises.

Therefore, based on the problems mentioned above, this paper will use data from Chinese A-share listed companies and combine it with city-level indicators of computing infrastructure. A fixed-effects model will be used to determine the effect of the development of urban computing infrastructure in different areas at different times on the extent of digital-green transformation in a company. The three main contributions of this paper are as follows: First, we are moving away from the old idea that computing infrastructure is only a tool for digital empowerment and have started integrating it into the antecedent analysis framework of digital-green integration. Second, we have theoretically conceived and empirically verified the "empowerment effect" and "crowding-out effect" of computing infrastructure. Finally, we have provided micro-level evidence to support the national strategy of "coordinated development of computing and electricity" and put forward policy suggestions for balancing the construction of computing infrastructure with carbon emission limits.

2. Literature review

Computing infrastructure is now supporting the changes in society and the economy during the digital era. Several scholars have studied the economic effects in different ways. Chao Xiao-jing and others have found that computing infrastructure promotes the integration of real and digital economies mainly by means of marketisation of data and distributed innovation [1]. Mao Feng-fu and others have found that building a computer system can help a company go digital by reducing transaction costs and expanding the market [2]. Sun Bo-yue and others found that the regional computing infrastructure has helped to reduce the barrier for enterprises to move from the real economy to virtual activities and has supported the development of financial technology [3]. Zhou Jian-ping and others have found that the construction of supercomputing centres can strengthen the connectivity of urban future industrial innovation networks [4]. Zhang Ying-ying and Mi Xu-ming have found that computing infrastructure drives the main technological innovation of enterprises [5]. All of the above studies have found that computing infrastructure positively affects the integration of industry and technology, digitalisation, investment behaviour, innovation networks and core technological innovation. However, the analysis performed so far has only taken into account one part of the general plan for digital-green development and has not considered both the digital and green goals together.

Recently, some studies on the reasons for the digital-green integration of enterprises have begun to accumulate. Yu Fei-fei and others have found that the development of data-element markets can promote the coordinated digital-green transformation of manufacturing enterprises by improving the efficiency of resource allocation [6]. Wang Rui and Gong Shi-han have discovered that the green finance pilot policies are advancing the digital-green synergy [7]. Li Ping and others have found that patient capital can be employed to combine digital and green technologies in order to reduce financing pressure and promote enterprise innovation [8]. Yu Fei-fei and others have also found that ecological consciousness can promote the joint digital-green transformation of high-energy-consuming and high-emission enterprises [9]. Xiong Lin-bo and others have found that network infrastructure promotes the coordinated development of digitalisation and greening [10]. Although

the above studies have provided all sorts of reasons for the integration of digital and green development, they have not been examined in combination.

Based on the two threads of literature above, the current research has obvious shortcomings. On the one hand, some progress has been made in the study of the economic impact of computing infrastructure; however, the current analysis is still too limited and has not addressed the joint strategic goal of digital-green integration. At the same time, although some research has listed several reasons for the development of digital-green integration, it has not directly explored the role of urban computing infrastructure, the basis for the digital economy. Therefore, it is necessary to integrate the urban computing infrastructure with the digital-green integration of enterprises to form a single analytical framework and systematically explore the causal links, transmission paths and boundaries among them; this will expand the research scope of the economic impact of computing infrastructure and correct deficiencies in previous studies on digital-green integration, and also better address the complex situation of both "empowerment" and "crowd-out" effects of computing infrastructure.

3. Mechanism analysis and hypothesis formulation

Urban Computing Infrastructure can help the company achieve the goals of digitalisation and green development with a small budget. With the development of computing power, the cost of collecting and analysing environmental data has fallen; therefore, it is now possible to find periods of high energy consumption in production and optimise these processes. At the same time, it will reduce the cost of environmental information disclosure and alleviate information asymmetry between enterprises and external investors. Expand the scale of green finance for all parties, reduce the cost of debt financing, obtain a stable long-term fund for the project, and achieve both digital and green transformation.

Urban Computing Infrastructure Promotes the Digital-Green Integration of Enterprises in Real-Sector Industrial Upgrading. With the development of computing, many industries have begun to use digital technology. With the help of technology, we can use high-end digital production tools and data analysis at a lower cost. At the same time, the computing infrastructure can link data and business at the upper and lower ends of the supply chain, integrate digital technology, and promote green production scheduling and energy saving. Help us make reasonable production plans and reduce waste; thus, it will offer a good reference for digital-green construction.

Urban Computing Infrastructure Advancement and Enterprise Digital-Green Integration Innovation. By greatly reducing the marginal cost of large-scale trial-and-error experiments and simulations, computing infrastructure can be employed to conduct many tests of integrated solutions for digital and green technologies in virtual environments; thus, the R&D cycle will be shortened and risks reduced. Increase the supply of external information on corporate innovation to encourage more investment in collaborative innovation by the company. Therefore, digital technology will be used in the key areas of green manufacturing and carbon footprint management to enhance environmental protection and promote the joint development of green technology and ecological civilization.

Based on the above theoretical reasoning, Hypothesis 1 of this paper is that urban computing infrastructure positively affects the digital-green transformation of enterprises.

4. Variable specification and model selection

4.1. Data sources

Data for this study are the A-share listed companies in China from 2000 to 2025. The following are the steps that have been taken in the data processing stage: (1) Companies listed as ST or *ST were excluded; (2) Samples with obviously abnormal financial data were removed; (3) Samples missing data for the statistical year were deleted; (4) To reduce the possible impact of extreme values on the test results, the top 1% and bottom 1% of continuous variables were winsorised. All the variable data were obtained from the Wind and CSMAR databases, and Stata 18.0 econometric analysis software was used to process the data. The first reason for this is that the computing infrastructure (IDC) has been manually collected and organised by the author.

4.2. Variable definition

The main explanatory variable in this paper is the level of development of urban computing infrastructure (IDC). Computing infrastructure refers to the set of computational resources, and among all the places for the development of this, data centres have been chosen as the primary location so far. Therefore, this paper will gather and organise data on the development of data centres in different areas to obtain information about the local computing infrastructure. The particular measurement method is as follows: Use Python to scrape historical data of telecommunications business operation licenses issued by the government platform of the Ministry of Industry and Information Technology. From this data, we filter and keep only the records of Internet data centre services. Then, we manually extract the information on the locations of data center facilities and the issuance dates from the license coverage details, aggregate them at the city-year level to obtain the number of newly approved data centers in each prefecture-level city for each year, and cumulatively sum the incremental data of newly approved data centers starting from the first licensing period. The running total is the number of data centres in a particular city and thus serves as a proxy for the level of urban computing.

The first dependent variable in this paper is the degree of digital-green integration by enterprises (DG). We have set up the general assessment system in two parts: digital transformation and green transformation. Both categories have an 'input' and an 'output'. The original data for the above indicators are obtained from the annual financial reports of listed companies and patent authorisation data from the China National Intellectual Property Administration. Clean and standardised, the above data are organised into a panel structure for the listed companies.

Table 1. General evaluation system of enterprises. Digital and green transformation

Evaluation subject	Indicator Selection	Calculation method	Process	Symbol	Indicator Weight
	Digital intangible assets	The ratio of intangible assets related to digitalization to total intangible assets for listed companies	Investment	Positive	35.36%

Table 1. (continued)

Digital transformation	Digital Economy Patent	Number of digital economy patent applications by listed companies	Output	Positive	64.64%
	Environmental investment	Investment directly related to environmental protection in the "Construction in Progress" account / total enterprise assets	Investment	Positive	37.60%
Green transformation	Environmental protection expenditure	Environmental protection-related expenses in the "Administrative Expenses" detail table / Total operating revenue of the enterprise	Output	negative	32.81%
	Green Patent	Environmental protection-related expenses in the "Administrative Expenses" detail table / Total operating revenue of the enterprise	Output	Positive	29.59%

The control variables in this paper are firm size (Size), leverage (Lev), profitability (ROA), firm age (FirmAge) and market value (TobinQ).

4.3. Model selection

To study the effect of the urban computing infrastructure (IDC) on digital-green integration (DG), a time-fixed-effects model is employed in the regression analysis, and the following regression model (1) is constructed:

$$DG_{it} = \beta_0 + \beta_1 * IDC_{it} + \sum \alpha_k controls_{it} + \lambda_t + \varepsilon_{it} \quad (1)$$

ε_{it} is the random error term; i and t are firm and year, respectively. The model includes year fixed effects λ_t , k is the number of control variables, β_0 is the constant term, and β_1 is the coefficient of the independent variable.

5. Empirical analysis

5.1. Descriptive statistics

As shown in Table 2, the mean value of the independent variable urban computing infrastructure (idc1) is 0.086, the standard deviation is 0.143, the minimum value is 0, and the maximum value is 0.628. Therefore, the general level of computing infrastructure in the sample cities is relatively low, and there are large differences among the cities. It can be seen that the construction of urban computing facilities in China is still in its initial stages, and there are significant regional disparities in the supply capacity of digital infrastructure. The mean of the dependent variable, enterprise digital-green integration (DGI), is 0.539, the standard deviation is 0.383, the minimum is 0 and the maximum is 1; thus, the general level of digital-green integration among the sample enterprises is relatively high. However, the extent of synergy between digitalisation and green development at different firms varies; some have achieved a relatively high level, and others are still at a lower stage. There may be a shortage in the supply capacity of computing infrastructure in some cities, and all these differences are likely due to the joint effect of firm-specific resources, industry characteristics, management ability and regional policy environments. All the control variables have reasonable standard deviations and extreme values, are generally in line with the statistical features reported in the existing literature, and thus their distribution in the sample data is reasonable and they are representative; therefore, a reliable foundation has been laid for the subsequent baseline regression and heterogeneity analyses.

Table 2. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
DGI	57178	0.539	0.383	0	1
idc1	57178	0.086	0.143	0	0.628
Size	57178	22.08	1.306	19.171	26.501
Lev	57178	0.427	0.207	0.028	0.99
ROA	57178	0.035	0.068	-0.485	0.255
TobinQ	57178	1.963	1.306	0.787	17.729
FirmAge	57178	2.859	0.433	1.099	3.738

5.2. Benchmark regression

Table 3 shows the basic regression results of the effect of urban computing infrastructure (idc1) on enterprise digital-green integration (DGI). Column (1) shows that, without adding any control variables or year fixed effects, the coefficient of idc1 is 0.4735 and is significant at the 1% level. Column (2): After adding year fixed effects, the coefficient is 0.1005 and is still statistically significant. Column (3) includes all control variables but does not include year fixed effects; the coefficient is 0.1798 ($p < 0.01$). Column (4) includes both the full-control variables and year fixed effects, and the idc1 coefficient is 0.0888; it is still significant at the 1% level. This shows that even after considering all other reasons, the influence of urban computing infrastructure on the digital-green integration of enterprises is still positive and strong. Based on the coefficient in column (4) of the economic model, an increase of one unit in the urban computing infrastructure leads to an

average increase of about 0.0888 standard units in the DGI index. Given that the mean of DGI is 0.539 and the standard deviation is 0.383, this effect is about 23.2% of the standard deviation of the dependent variable, and it is relatively large. In short, according to the results of the baseline regression, good urban computing facilities can help promote the close coordination of enterprise digital transformation and environmental protection.

Table 3. Benchmark regression analysis table

	(1)	(2)	(3)	(4)
	DGI	DGI	DGI	DGI
idc1	0.4735*** (0.01)	0.1005*** (0.01)	0.1798*** (0.01)	0.0888*** (0.01)
Size			0.0611*** (0.00)	0.0191*** (0.00)
Lev			-0.2744*** (0.01)	-0.0033 (0.01)
ROA			0.0723*** (0.02)	0.1828*** (0.02)
TobinQ			0.0161*** (0.00)	0.0035*** (0.00)
FirmAge			0.1978*** (0.00)	-0.0739*** (0.00)
_cons	0.4988*** (0.00)	0.0361*** (0.01)	-1.3081*** (0.03)	-0.2274*** (0.03)
N	57178	57178	57178	57178
R ²	0.031	0.421	0.132	0.429
adj. R ²	0.031	0.421	0.132	0.429
year	no	yes	no	yes

Standard Error in parentheses.
p < 0.1, *** p < 0.05, ** p < 0.01

5.3. Robustness check

Table 4 shows a number of robustness tests carried out in this paper to confirm the reliability of the benchmark regression results. Column (1) adds the two financial variables Asset Turnover Ratio (ATO) and Cash Flow to the set of control variables to avoid omission and reduce omitted variable bias. The coefficient for idc1 is still 0.0876 and is significant at the 1% level, in line with the baseline result. Column (2) limits the sample to observations after 2016 to avoid possible distortion caused by the selection period of the sample; the idc1 coefficient is 0.0837 and is still significant at the 1%, so the results do not depend on any particular time window. Column (3) has been robust standard errors to address heteroskedasticity; the idc1 coefficient is 0.0888 (p < 0.01) and is the

same as in column (4), so estimation efficiency has not changed. Column (4) lags the independent variable *idc1* by one period to address the problem of endogeneity caused by reverse causality, that is, it regresses current-year corporate green integration on the city's computing infrastructure level from the previous year. The coefficient is 0.0937 and is at the 1% significance level; thus, we can assume a causal relationship. Column (5) is added to the basic model to account for the unobserved, time-invariant differences among industries. The *idc1* coefficient is 0.0261 and significant at the 5% level. Although it is a small number, it is positive and statistically significant; industry fixed effects have likely absorbed some of the variation in computing infrastructure among industries. It is still the same. In short, even after adding control variables, changing the sample period, adjusting standard errors, lagging the independent variable, or adding industry fixed effects, the coefficient of *idc1* is still positive and statistically significant; thus, we can be confident that urban computing infrastructure promotes green integration in enterprises and that our initial regression results are reliable.

Table 4. Analysis of robustness test

	(1)	(2)	(3)	(4)	(5)
	DGI	DGI	DGI	DGI	DGI
<i>idc1</i>	0.0876*** (0.01)	0.0837*** (0.01)	0.0888*** (0.01)	0.0937*** (0.01)	0.0261** (0.01)
Size	0.0213*** (0.00)	0.0165*** (0.00)	0.0191*** (0.00)	0.0188*** (0.00)	0.0373*** (0.00)
Lev	-0.0441*** (0.01)	0.0075 (0.01)	-0.0033 (0.01)	-0.0017 (0.01)	0.0296*** (0.01)
ROA	0.1067*** (0.02)	0.1128*** (0.02)	0.1828*** (0.02)	0.1612*** (0.02)	0.2003*** (0.02)
TobinQ	0.0040*** (0.00)	0.0063*** (0.00)	0.0035*** (0.00)	0.0057*** (0.00)	-0.0033*** (0.00)
FirmAge	-0.0731*** (0.00)	-0.0766*** (0.01)	-0.0739*** (0.00)	-0.0821*** (0.00)	-0.0288*** (0.00)
ATO	0.0614*** (0.00)				
Cashflow	-0.1244*** (0.02)				
_cons	-0.2867*** (0.03)	0.4957*** (0.03)	-0.2274*** (0.03)	-0.1957*** (0.03)	-0.8192*** (0.03)
<i>N</i>	56693	32164	57178	50909	57178
<i>R</i> ²	0.435	0.289	0.429	0.419	0.504
adj. <i>R</i> ²	0.435	0.289	0.429	0.419	0.503

Table 4. (continued)

year	yes	yes	yes	yes	yes
------	-----	-----	-----	-----	-----

Standard Errors in parentheses.

p < 0.1, *** p < 0.05, ** p < 0.01

5.4. Heterogeneity analysis

The results of the heterogeneity test are shown in Table 5. Analyze the effect of the Urban Computing Infrastructure (IDC1) on Digital-Green Integration (DGI) in terms of the two dimensions of enterprise ownership type and industry competitiveness. Group regression shows that for non-state-owned enterprises, the coefficient of *idc1* is 0.1363 and it is significant at the 1% level, but for state-owned enterprises, this coefficient is only 0.0159 and not significant. Therefore, most of the support effect of computing infrastructure comes from non-state-owned enterprises. It may be that the market competition has increased and the organisation structure of non-state-owned enterprises is more flexible; therefore, they can quickly obtain the computing benefits and integrate them with the synergistic applications of digitalisation and greening. State-owned enterprises have many resources but are also subject to many policy goals and hierarchical restrictions; thus, the additional benefit of computing investment will be small. Based on the above division of industry characteristics, it can be seen that computing infrastructure has a stronger positive effect in non-competitive and regulated industries compared with competitive and unregulated industries. The coefficients in the first two areas are 0.1700 and are statistically significant at the 1% level; in competitive and unregulated industries, the coefficient is 0.0607 and is only marginally significant at the 10% level. It is possible that non-competitive or regulated industries have a high energy consumption and emission level, are relatively difficult to enter, and therefore need to make long-term, systematic investments in computing power to optimise production processes and energy management and achieve better digital-green integration. Competitive industries have relatively low profit margins and are changing rapidly in terms of technology; therefore, the investment in computing will be short-lived and not widely used. Generally speaking, the heterogeneity test shows that the impact of computing infrastructure on digital-green integration is not the same everywhere; that is, it is relatively stronger for non-state-owned enterprises and non-competitive industries, so different policies should be issued.

Table 5. Heterogeneity test analysis table

	(1)	(2)	(3)	(4)	(5)	(6)
	DGI	DGI	DGI	DGI	DGI	DGI
	State-owned enterprise	Non-state-owned enterprises	Competitive industry	Non-competitive industry	Regulated industry	Non-regulated industry
<i>idc1</i>	0.0159 (0.02)	0.1363*** (0.01)	0.0607* (0.03)	0.1700*** (0.01)	0.1700*** (0.01)	0.0607* (0.03)
Size	0.0234*** (0.00)	0.0349*** (0.00)	0.0108*** (0.00)	0.0370*** (0.00)	0.0370*** (0.00)	0.0108*** (0.00)
Lev	0.0423***	-0.0213**	-0.0061	0.0087	0.0087	-0.0061

Table 5. (continued)

	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)
ROA	0.1721***	0.1401***	-0.0195	0.1789***	0.1789***	-0.0195
	(0.04)	(0.02)	(0.05)	(0.02)	(0.02)	(0.05)
TobinQ	0.0167***	-0.0004	-0.0046	0.0079***	0.0079***	-0.0046
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
FirmAge	-0.0481***	-0.0719***	-0.1012***	-0.0814***	-0.0814***	-0.1012***
	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)
_cons	-0.4147***	-0.5435***	0.0834	-0.5351***	-0.5351***	0.0834
	(0.05)	(0.04)	(0.06)	(0.04)	(0.04)	(0.06)
N	22674	34448	12000	36911	36911	12000
R ²	0.412	0.416	0.199	0.288	0.288	0.199
adj. R ²	0.411	0.415	0.197	0.288	0.288	0.197
year	yes	yes	yes	yes	yes	yes

Standard error in parentheses.
p < 0.1, *** p < 0.05, ** p < 0.01

6. Conclusion and recommendations

Organise the Impact of Urban Computing Infrastructure on the Digital-Green Integration of Enterprises Based on Data from A-share Listed Companies in China. As shown in the first regression, the urban computing infrastructure is positively correlated with the degree of digital-green integration, and this result is not significantly changed after several sensitivity tests. Based on the above analysis of the mechanisms, there are three transmission paths: the urban computing infrastructure promotes digital-green integration by reducing financing constraints, advances real-digital industrial upgrading, and spurs enterprise innovation; thus, financial security, a technological foundation, and endogenous momentum are all in support of this integration. According to the above analysis of heterogeneity, the effect is stronger for non-listed companies and unlisted sectors.

The shortcomings of this study will be the subject of the next research. As a result of the development of the urban computing infrastructure, many changes in communication networks and policy disruptions caused by initiatives such as "East Data West Computing" can also be regarded as quasi-natural experiments to improve causal identification in future research. Other reasons may be that the organisation has been reorganised, its workforce has been restructured, or the area of computing infrastructure has not supported the spread of digital-green integration.

References

- [1] Chao, X., Shen, L., & Guo, H. (2026). The impact of computing infrastructure on the integration of real economy industries and technology. *Cai Mao Jing Ji*, 47(4), 104-121. Retrieved from <https://doi.org/10.19795/j.cnki.cn11-1166/f.20260320.005>.
- [2] Mao, F., Wei, Y., & Gao, Y. (2025). Computing infrastructure and enterprise digital transformation. *Economic Management*, 47(12), 101-120. Retrieved from <https://doi.org/10.19616/j.cnki.bmj.2025.12.006>.

- [3] Sun, B.-y., Yu, B.-b., & Hu, Y.-j. (2025). Does the construction of computing infrastructure suppress enterprises' shift from the real to the virtual economy?—Empirical evidence from data center development in Chinese prefecture-level and above cities. *Financial Research*, (7), 95-112.
- [4] Zhou, J., Zhao, Y., & Xu, W. (2026). The impact of computing infrastructure on urban future industry innovation networks. *Research on Science and Technology Management*, 44(7), 1361-1373. Retrieved from <https://doi.org/10.16192/j.cnki.1003-2053.20250714.004>.
- [5] Zhang, Y., & Mi, X. (2026). Computing infrastructure development and enterprise core technology innovation—A discussion on the synergistic effects of an active government and an efficient market. *Journal of Shanxi University of Finance and Economics*, 48(3), 13-25. Retrieved from <https://doi.org/10.13781/j.cnki.1007-9556.2026.03.002>.
- [6] Yu, F., Liu, W., & Tan, S. Can the development of data element markets promote digital and green synergistic transformation in manufacturing enterprises? *Science & Technology Progress and Policy*, 1-13.
- [7] Wang, R., & Gong, S. (2026). A study on the impact of green finance pilot policies on the coordinated transformation of enterprises toward digitalization and greening. *Financial Theory and Practice*, (3), 99-118.
- [8] Li, P., Li, Z., & Song, X. (2026). The impact of patient capital on the synergistic transformation of enterprises toward digital and green development. *Modern Management Science*, (2), 147-159.
- [9] Yu, F., Yang, Y., Zhang, Q., & Tan, S. (2025). A study on the mechanism of environmental attention influencing the synergistic transformation of "high-energy-consumption and high-emission" enterprises toward digital and green development. *Soft Science*, 39(12), 120-126+144. Retrieved from <https://doi.org/10.13956/j.ss.1001-8409.2025.12.15>.
- [10] Xiong, L., Chen, W., & Suleiman, S. (2025). A study on the impact of network infrastructure on the coordinated development of digitalization and greening—Causal inference based on double machine learning. *Enterprise Economy*, 44(8), 101-110. Retrieved from <https://doi.org/10.13529/j.cnki.enterprise.economy.2025.08.010>.