Research on the Impact of Digital Infrastructure Construction on Enterprise Green Transformation-Quasi-Natural Experiment Based on the Pilot Policy of "Smart City"

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***Abstract*—This paper employs a multi-period double differential model to analyze how digital infrastructure impacts the green transformation of enterprises and contributes to the high-quality development of the digital economy. It utilizes panel data from China's Shanghai and Shenzhen A-share companies spanning 2008 to 2021. The "smart city" policy serves as a proxy variable for digital infrastructure, while green total factor productivity is used to measure the green transformation of enterprises. The results show that digital infrastructure effectively drives the green transformation of enterprises, and their reliability is confirmed through robustness tests. The study identifies heterogeneous effects at both enterprise and city levels, demonstrating that digital infrastructure notably enhances the green transformation of state-owned enterprises. Furthermore, the urban outcomes in the eastern region exhibit more pronounced effects compared to those in the central and western regions. Moreover, heightened environmental regulation at enterprise locations diminishes the influence of digital infrastructure on their green transformation. Finally, enterprises and governments are urged to consider the impact of the digital economy on sustainable development when promoting digital and green transformation initiatives. This study offers new insights and empirical evidence on the relationship between digital infrastructure and the green development of enterprises, providing policy guidance for advancing China's green and sustainable economic development.**

***Keywords*—digital infrastructure, green transformation of enterprises, difference-in-difference method**

I. Introduction

In recent years, the visible repercussions of industrialization and urbanization on environmental pollution have become increasingly pronounced. Climate change poses formidable challenges, including global warming and the intensification of extreme weather events, impacting societies, economies, and ecosystems significantly. The traditional industrial economic model frequently leads to environmental degradation and ecological harm, heightening environmental risks and presenting severe obstacles to China's pursuit of high-quality economic development. Through the adoption of green transformation strategies, enterprises can transition to renewable energy sources, enhance energy efficiency, optimize resource utilization, and improve production efficiency using green technologies and management practices. These measures not only mitigate environmental risks for businesses and society but also address the urgent need for sustainable economic and environmental development. The 14th Five-Year Plan emphasizes the necessity of improving resource efficiency, promoting green production practices and lifestyles, cultivating environmental aesthetics, and guiding China's economy towards sustainable and robust development, including the transformation of enterprises towards environmental sustainability.

Concurrently, China's digital economy is rapidly expanding across diverse sectors such as e-commerce, artificial intelligence, big data, cloud computing, blockchain, and others. The role of the digital economy in national economic transformation and enterprise modernization warrants careful consideration. Highlighted as a central theme at the 2024 National Two Sessions, this year's government work report advocates further innovative development of the digital economy. Efforts will concentrate on advancing digital industrialization, enhancing industrial digitization, and fostering deep integration of digital technologies with the real economy. The digital economy facilitates the rapid flow of production factors, improves market efficiency, drives the transformation and modernization of traditional industries, promotes changes in production methods, and serves as a critical driver of high-quality economic growth. The digital economy is pivotal in advancing green economic development and bolstering national competitiveness.

Digital infrastructure forms the backbone of the digital economy's high-quality development. Since its inception in 2012, China's smart city initiative has expanded through successive pilot phases, encompassing 90 regions initially and subsequent batches. Smart cities have catalyzed the development of critical network infrastructure, including regional broadband Internet, underscoring digital infrastructure's role in facilitating enterprises' transition to advanced, intelligent, and digitally enabled operations, thereby promoting green enterprise transformations and fostering high-quality economic expansion. This study utilizes panel data from Shanghai and Shenzhen's A-share listed companies spanning from 2008 to 2021, leveraging the "smart city" pilot policy as a quasi-natural experiment and employing the difference-in-differences method to empirically examine the influence of digital infrastructure construction on enterprises' green transformation development.

This research contributes significantly on two fronts: Firstly, it innovates by exploring the impact of digital infrastructure construction on enterprise green transformation, addressing a critical gap in current research. Secondly, it innovates by applying pilot policies, leveraging the "smart city" initiative as a quasi-natural experiment to deeply analyze its effects on enterprise green transformation. Through detailed policy analysis, this study provides a specific empirical basis that enhances research innovation.

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By shedding light on the impact of digital infrastructure construction on advancing enterprise green transformation, this study offers novel insights and contributes substantively to both research perspectives and methodological advancements.

II. Theoretical Analysis and Research Hypotheses

A. Digital Economy, Digital Infrastructure and Green Transformation of Enterprises

Given the rapid expansion of China's digital economy and its critical role in sustainable development, this paper conducts a comprehensive review of pertinent literature. The digital economy, grounded in the Internet, signifies a technological revolution that brings profound innovative implications, acting as a transformative force for the new economic landscape. Digital technologies not only have the potential to alleviate the environmental footprint of economic activities but also foster community collaboration and enhance social cohesion (Miller, 2001). China's present trajectory of digital economy development is characterized by its seamless integration with the traditional economic framework. At the microeconomic level, the widespread adoption of Internet and other technological applications has enabled economies of scale and scope, thereby facilitating economic equilibrium. On a macroeconomic scale, emerging technologies such as the Internet propel rapid economic expansion by introducing novel input factors, optimizing resource allocation efficiency, and boosting overall total factor productivity. This synergy not only promotes economic growth but also cultivates an environment conducive to high-quality economic development (Jing, 2019).

Recent scholarly attention has increasingly focused on examining the profound impacts of the digital economy on enterprises. According to Li *et al.*, the evolution of the digital economy plays a pivotal role in enhancing the overall value of enterprises, with its effects significantly more pronounced among well-established firms compared to startups and businesses in their growth phases. Moreover, concerning the realm of property rights, non-state-owned enterprises exhibit a notably greater susceptibility to these impacts than their state-owned counterparts. The construction of digital infrastructure, recognized as a foundational pillar in the development of the digital economy, has attracted significant scrutiny due to its far-reaching economic implications. The widespread integration of information technology, notably exemplified by the Internet, has progressively embedded itself within traditional industries, thereby optimizing their structural dynamics and catalyzing substantial growth in regional economies (Zuo, 2020). Empirical studies underscore that policies promoting digital infrastructure not only enhance the operational environment for enterprises but also stimulate intensified market competition and foster robust expansion within the software and information technology service sectors. These developments are pivotal in advancing enterprises' efforts towards comprehensive digital transformation (Wang, 2023). Research on the impact of pilot policies on digital infrastructure construction suggests that smart city initiatives play a crucial role in mitigating regional environmental pollution and reducing sewage discharge through technological innovations and optimized resource allocation (Xu and Yang, 2022). Furthermore, scholars emphasize the economic implications of smart city development, highlighting its role in fostering urban technological innovation and enhancing green total factor productivity (Jiang *et al.*, 2021). In exploring the effects of digital infrastructure construction on enterprise green transformation, a study focuses on the environmental benefits of smart city development, particularly in improving efficiency and reducing pollution. It underscores that smart city initiatives positively influence the green total factor productivity of neighboring cities not directly involved in the pilot projects, illustrating the spatial spillover effects (Wang, 2022). Researchers examining air pollutant emissions in smart city pilot areas find that these initiatives effectively mitigate pollutants and improve air quality by upgrading industrial structures and optimizing urban spatial layouts (Gao, 2022). Another analysis covering indirect carbon emissions from 2010 to 2018 across 201 urban households in China reveals that smart city initiatives promote green urban consumption patterns through the adoption of smart technologies in transportation and education, thereby reducing urban carbon footprints (Wu, 2022).

A standardized definition of enterprise green transformation remains elusive in current literature. The existing body of research predominantly evaluates the levels of enterprise green transformation through methodologies such as comprehensive indices, text analysis, and alternative metrics. For instance, a framework for assessing industrial enterprises' green transformation encompasses six critical dimensions: green culture, strategic alignment, innovation capacity, resource input efficiency, production processes, and emission reduction initiatives (Yu, 2019). Utilizing crawler technology, researchers have analyzed keyword frequencies in annual reports to gauge the extent of enterprise green transformation (Wu, 2022). Furthermore, the surrogate index approach has been applied to measure enterprise green transformation by linking it with total factor productivity metrics (Huang, 2022). Current studies highlight that traditional total factor productivity measures often fail to comprehensively and accurately capture economic development quality, primarily because they overlook environmental considerations. In contrast, Green Total Factor Productivity (GTFP) offers a more holistic approach by integrating outputs such as pollution emissions and ecological factors, aligning more closely with contemporary green development principles (2016).

Currently, scholarly attention is predominantly directed towards the impact of the digital economy and its associated infrastructure on green transformation within industries and urban areas. This research underscores their positive influence on economic growth and industrial restructuring, although it tends to offer limited analysis specifically focused on enterprises. Studies on enterprise green transformation primarily delve into innovative technologies, emphasizing micro-level impacts such as enterprise valuation and advancements in green technologies, while broader examinations on overall efficiency and sustainable green development remain relatively scarce. This paper aims to fill this gap by concentrating on enterprises, employing comprehensive comparative indicators as benchmarks for assessing green transformation in empirical analyses. The objective is to thoroughly investigate the substantial implications of digital infrastructure construction for enterprises, thereby complementing existing literature. Future research directions should prioritize exploring the long-term and comprehensive impacts of digital infrastructure construction on enterprise green transformation, with a particular emphasis on sustainable development outcomes and environmental conservation efforts.

Therefore, hypothesis 1 is made: digital infrastructure construction can improve the level of green transformation of enterprises.

B. Regional Heterogeneity of Digital Infrastructure and Corporate Green Transformation

From the enterprise perspective, the ownership structure of enterprises can lead to differences in the policy effects of smart cities. State-Owned Enterprises (SOEs) may have greater access to resources compared to private enterprises. SOEs may find it easier to obtain government support and resources, enabling them to invest more readily in green transformation. This facilitates the effective transformation of smart city pilot policies into tangible actions and outcomes, potentially yielding greater benefits. In contrast, private enterprises may encounter uncertainty or implementation challenges due to resource constraints or operational pressures, potentially diminishing the policy's impact on their green transformation. Conversely, differences in market positioning and development strategies between SOEs and private enterprises exist: SOEs may prioritize long-term development and social responsibility, demonstrating greater responsiveness to government green transformation initiatives. In contrast, private enterprises may emphasize short-term interests and competitive market dynamics, potentially showing a weaker response to green transformation policies.

Therefore, Hypothesis 2 is made: the digital infrastructure construction can enhance the green transformation of state-owned enterprises, thereby enhancing their significant role.

C. Digital Infrastructure, Corporate Green Transformation and Environmental Regulation

Given the varying economic levels and digital technology infrastructure across regions where enterprises are located, the policy effects of smart city construction differ significantly. The eastern region may have a higher starting point in digital technology infrastructure, facilitating easier implementation of smart city construction, whereas the central and western regions may require more time and investment to achieve similar outcomes. Moreover, variations in industrial structure exist: the eastern region boasts a relatively advanced industrial structure, encompassing more green and high-tech industries, thus enhancing the smart city policy's impact on enterprise green transformation. Generally, the eastern region holds advantages in economic development, technological infrastructure, and industrial structure over the central and western regions.

Therefore, Hypothesis 3 is made: digital infrastructure plays a role in influencing the green transformation of enterprises across regions, with a notably greater impact on promoting green transformation in the eastern region.

D. Digital Infrastructure, Enterprise Green Transformation and Environmental Regulation

Enterprises exhibit significant variations in emission reduction behavior and outcomes due to the influence of environmental regulations, which has a profound impact on enterprise green transformation (Chen, 2021). Thus, given the regulatory role of environmental regulations in prefecture-level cities, the extent of enterprise green transformation in cities with stringent environmental regulations may be diminished by the influence of digital infrastructure construction.

Therefore, Hypothesis 4 is made: the intensity of environmental regulation negatively affects the adjustment in the construction of digital infrastructure aimed at promoting the green transformation of enterprises. Moreover, higher environmental regulation intensity will weaken the impact of the digital economy on the green transformation of enterprises.

III. Study Design

A. Model Settings

Empirical analysis was conducted using collected data to investigate the influence of digital infrastructure construction on enterprise green transformation. Regression analysis, causal inference, and other methods can be employed to evaluate the role of smart city pilot policies in this context. The "smart city" pilot policy has been gradually implemented in China in three phases: 2012, 2013, and 2014, making it a quasi-natural experiment due to its phased implementation. This study leverages variations in pilot policies over time and across regions, employing the Difference-In-Differences (DID) method to analyze how digital infrastructure construction affects enterprise green transformation. Here is the specific benchmark regression empirical model:

$$gtfp_{it} = \alpha_0 + \alpha_1 inter_{it} + \alpha_i X_{it} + \mu_i + \nu_t + \varepsilon_{it} \quad (1)$$

To examine the regulatory role of environmental regulation in influencing the impact of digital infrastructure on the green transformation of enterprises, the following regulatory effect model is developed:

$$gtfp_{it} = \alpha_2 + \alpha_3 inter_{it} + \alpha_4 ER_{it} + \alpha_5 inter_{it} * ER_{it} + \alpha_i X_{it} + \mu_i + \nu_t + \varepsilon_{it} \quad (2)$$

These variables include gtf, representing the green transformation of enterprises; ER, which stands for environmental regulation; and inter, denoting digital empowerment, with its coefficient indicating the effect on enterprise green transformation. The model incorporates an intercept term and control variable X, where I signifies individual enterprises and t signifies years; additionally, it includes individual and time fixed effects, with ε denoting a random disturbance term.

B. Variable Selection

1) Explanatory variables

T The core explanatory variable inter_it represents the virtual variable of the "smart city" pilot policy, used to assess how enhancements in digital infrastructure construction influence enterprise green transformation. A group virtual variable "treat" was established. Enterprises in "smart city" pilot cities constituted the experimental group with a value of 1, while enterprises in non-pilot cities served as the control group with a value of 0. A policy time dummy variable "post" was set: its value is 1 if the observation sample's time corresponds to or is after the year of policy implementation; otherwise, it is 0. Lastly, the differential term inter_it is calculated by multiplying "treat" and "post". It is assigned a value of 1 when enterprises in region *i* adopt the "smart city" policy in year t and thereafter; otherwise, it remains 0.

2) Explained variables

In this study, the dependent variable gtfp_it is chosen as the green total factor productivity, an alternative index for measuring enterprise green transformation, allowing for a more objective investigation into the comprehensive impact of digital infrastructure on enterprise green transformation. Enterprise green total factor productivity is established with reference to Cui and Lin (2019). The evaluation system includes environmental pollution of enterprises, and the non-radial SBM-ML index is employed to measure green total factor productivity of enterprises. The input and output indicators for green total factor productivity of enterprises are assessed as follows:

Table 1. Measurement of enterprise green total factor productivity index

Level 1 indicators	**Secondary indicators**	**Level 3 index**	**Main Contents**
Input	Input	Labor input	Number of Enterprise Employees
		Capital input	Net fixed assets of the enterprise
		Energy input	The industrial electricity consumption in the city where the enterprise is located is based on the proportion of the employees of the enterprise in the employment of urban personnel.
Outputs	expected output	Enterprise Revenue	Business income
	Unexpected output	industrial sulfur dioxide emission	industrial sulfur dioxide emissions
		Industrial wastewater discharge	Industrial wastewater discharge
		Industrial dust emission	Industrial dust emissions

3)Control variables

Table 2. Variable description

Variable Category	**Variable name**	**Variable Symbols**	**Specific indicators**
Explained variable	Enterprise Green Transformation	gtfp	green total factor productivity
Explanatory variables	Smart City Pilot	inter	When region I piloted the "smart city" policy in year t and later, the $inter$ _it is 1, otherwise it is 0.
Control variable X	Enterprise age	lnage	The difference between the fiscal year and the year of establishment of the enterprise.
	Enterprise scale	size	Take the natural logarithm of the total of each item of the asset.
	Asset-liability ratio	lev	Total Liabilities/Total Assets
	Return on total assets	roa	Net profit/balance of total assets
	Cash Ratio	cash	Closing balance of cash and cash equivalents/current liabilities
	Percentage of management shareholding	stock	Number of shares held by directors/total number of shares.
	Enterprise growth	growth	(Operating Income Current Year Single Quarter Amount-Operating Income Last Single Quarter Amount)/(Operating Income Last Single Quarter Amount)
	Equity concentration 1	topten	The shareholding ratio of the company's largest shareholder
	Equity concentration 4	topone	The sum of the shareholding ratios of the top ten major shareholders of the company.
	Market value to book ratio	tq	Market Value/Total Assets
Adjustment variable	The intensity of environmental regulation	ER	Proportion of environmental vocabulary to total number of work reports

C. Data Sources

This paper utilizes panel data from China's A-share listed companies spanning the period 2008 to 2020. To enhance the quality of empirical testing, the following data preprocessing steps were undertaken: (1) Exclusion of enterprises from the financial industry; (2) Removal of ST and ST* designated enterprises; (3) Deletion of enterprises delisted during the sample period; (4) Winsorization of all continuous variables at the 1% and 99% levels. Ultimately, 20,428 annual observation samples of listed companies were retained.

Data sources included: "China City Statistics Yearbook", "China Environmental Statistics Yearbook", annual reports and social responsibility reports of listed companies, website information of listed companies, CSMAR database, and the list of national smart city pilot cities from the official website of the Ministry of Housing and Urban-Rural Development of China.

IV. Empirical Research

A. Baseline Results

This paper performs baseline results using Eq. (1). Table 3 presents the baselin regression results (1), (2), and (3) illustrating the impact of smart city construction on enterprise transformation. Column (1) presents regression results without control variables and without controlling for time and individual fixed effects; Columns (2) and (3) display results gradually incorporating control variables and bidirectional fixed effects, respectively. The regression results in columns (1), (2), and (3) indicate that after progressively incorporating control variables and controlling for fixed effects, the estimated coefficients of smart city construction are significantly positive. This suggests that smart city construction promotes improvements in enterprises' Green Total Factor Productivity (GTFP) and facilitates their green transformation. Hypothesis 1 has been confirmed, providing robust micro-evidence supporting the ongoing promotion of smart city construction in China, and affirming its positive impact on the green transformation of enterprises.

Table 3. Regression results

	(1)	(2)	(3)	(4)	(5)
inter	0.09720 * * *	0.03764 * * *	0.00081 * *	0.00061	0.00308 * * *
	(78.24076)	(14.85008)	(2.02477)	(1.63108)	(3.10293)
lowcarbon				-0.00031	
				(-0.85607)	
ER					0.14149
					(1.27598)
inter*ER					−0.65624 * * *
					(−2.73795)
X	N	Y	Y	Y	Y
individual fixed	N	N	Y	Y	Y
Fixed time	N	N	Y	Y	Y
_cons	0.90516 * * *	−0.09729 * * *	0.93921 * * *	0.93154 * * *	0.93593 * * *
	(7.6e +02)	(−3.18606)	(1.3e +02)	(4.9e +03)	(1.2e +02)
N	20428	16417	16412	18557	14932
r2	0.13526	0.57225	0.98865	0.98812	0.98871
r2_a	0.13522	0.57196	0.98760	0.98725	0.98766
F	6.1e +03	4.3e +02	0.85471	1.45716	1.09465

t statistics in parentheses
* p < 0.1, **p < 0.05, *** p < 0.01

B. Robustness Check

To address concerns about our identification strategies, we conduct a battery of robustness checks on our main results.

1)Parallel trend test

According to the dynamic regression findings, green total factor productivity exhibits no substantial alteration during the initial years following policy implementation. However, the regression coefficient demonstrates a significant increase above zero at the outset of policy enactment, and the smart city pilot successfully satisfies the requirements of the parallel trend test. These results suggest that while immediate impacts on green productivity may be modest, the policy's introduction marks a notable shift, aligning with anticipated trends and validating the effectiveness of the smart city initiative in promoting sustainable economic outcomes.

2)Placebo test

To strengthen the robustness of this study's findings against random variables, a methodological approach was employed where smart city pilot cities were randomly selected. This introduced fictitious new Difference-In-Differences (DID) variables to simulate varying policy timings. Using model (1), 500 iterations of self-sampling regressions were conducted to assess the stability of the results. Fig. 1 depicts the distribution of inter-estimated coefficients observed across these 500 regressions. The regression coefficients of the pseudo-inter variables, simulated under random processing, exhibit a clustering pattern around a standard normal distribution centered near 0, with the majority of estimates falling below the baseline regression coefficient of 0.00073. This indicates that the conclusions drawn from the study are unlikely to be influenced by random fluctuations, thus reinforcing the reliability of the findings. Furthermore, only a small proportion of pseudo-inter regression coefficients have p-values below 0.10, suggesting non-significance at the 10% level and further supporting the robustness of the study's conclusions against potential random effects. These rigorous analytical methods underscore the confidence in the study's ability to accurately assess the impact of smart city policies on the variables of interest.

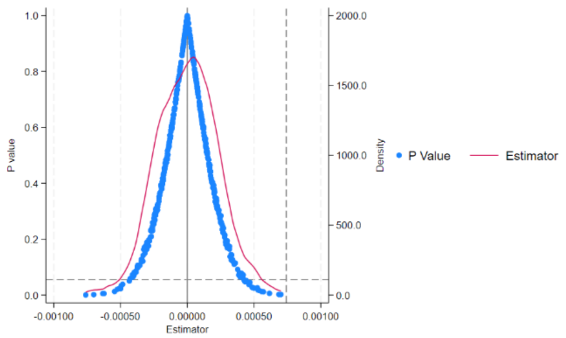

Fig. 1. Placebo test.

3)Exclude other policy interference in the same period

To ensure the accuracy of the regression results in this study, efforts were made to eliminate interference from concurrent policies. It was found that urban policies influencing enterprise innovation during this period also encompassed the low-carbon city pilot. The National Development and Reform Commission released three batches of lists for low-carbon city pilots in July 2010, December 2012, and January 2017, covering 122 prefecture-level cities, some of which overlapped with smart cities. To address potential interference from these policies, a low-carbon city dummy variable was included in the baseline regression model to control for its impact on the green total factor productivity of enterprises. Analysis in Column (4) of Table 3 reveals that while the regression coefficient for the smart city pilot variable (inter) remains significantly positive and consistent with the baseline result, the coefficient for the low-carbon city variable (lowcarbon) is not significant, underscoring the robustness of the paper's conclusions.

C. Heterogeneity Analysis

1)Firm-level heterogeneity

This paper categorizes enterprises into state-owned and non-state-owned for regression analysis, as presented in Table 4. The estimated coefficient for state-owned enterprises is significantly positive, while that for non-state-owned enterprises is not statistically significant. These findings suggest that the smart city pilot policy notably enhances the Green Total Factor Productivity (GTFP) of state-owned enterprises, providing evidence for hypothesis 2.

Table 4. Results of firm-level heterogeneity

	(1) **SOE**	**(2)** **non-state-owned enterprises**
inter	0.00084 *	0.00059
	(1.65936)	(0.76861)
X	Y	Y
individual fixed	Y	Y
Fixed time	Y	Y
_cons	0.93272 * * *	0.94857 * * *
	(88.92632)	(79.77223)
N	10123	6008
r2	0.98894	0.98852
r2_a	0.98782	0.98721
F	1.08050	0.33298

t statistics in parentheses
* p < 0.1, **p < 0.05, *** p < 0.01

2)Regional heterogeneity

This paper categorizes enterprise locations into three regions: eastern, central and western, and performs grouped regression analysis, detailed in Table 5. Among these regions, only the estimated coefficient for the eastern region shows a significant positive effect. Conversely, coefficients for the central and western regions are not significant, indicating that the smart city pilot policy significantly supports green transformation in the eastern region while not significantly affecting enterprises in the central and western regions, thereby confirming hypothesis 3.

Table 5. Results of regional heterogeneity

	(1) **Eastern Region**	**(2)** **Central Region**	**(3)** **Western Region**
inter	0.00094 *	0.00007	0.00074
	(1.78950)	(0.07784)	(0.69493)
X	Y	Y	Y
individual fixed	Y	Y	Y
Fixed time	Y	Y	Y
_cons	0.94033 * * *	0.94671 * * *	0.90133 * * *
	(95.23624)	(52.67874)	(50.22024)
N	9432	2842	2596
r2	0.98874	0.98877	0.98880
r2_a	0.98771	0.98760	0.98757
F	0.62180	0.72877	0.97218

D. Mechanism Analysis

The results of the regulatory effect model are presented in fifth column of Table 3. The estimation reveals that the coefficient of the explanatory variable inter is significantly positive at the 1% significance level. Furthermore, the interaction term inter*ER between the smart city dummy variable and environmental regulation intensity exhibits a significantly negative coefficient at the 1% significance level. This suggests that higher environmental regulation intensity diminishes the promoting effect of the "smart city" pilot on enterprise green transformation, thereby confirming hypothesis 4.

V.CONCLUSION

A. Summary

This paper employs a multi-period double differential model to investigate the impact of digital infrastructure on enterprise green transformation and the high-quality development of the digital economy, utilizing panel data from China's Shanghai and Shenzhen A-share companies spanning 2008 to 2021. The "smart city" policy serves as a proxy for digital infrastructure, while green total factor productivity serves as an alternative measure for enterprise green transformation. The findings indicate that digital infrastructure effectively promotes enterprise green transformation, validated through robustness tests. The study also reveals heterogeneous effects across enterprises and cities: digital infrastructure notably enhances the green transformation of state-owned enterprises, with more pronounced effects observed in urban areas of the eastern region compared to the central and western regions. Furthermore, an increase in environmental regulation intensity at enterprise locations diminishes the impact of digital infrastructure on enterprise green transformation.

B. Recommendations

1)Enterprise

State-owned enterprises should leverage government support and resources fully, actively engage in digital infrastructure pilot projects, and enhance collaboration with government departments to ensure effective policy implementation. Additionally, they should prioritize social responsibility and environmental protection, cultivate a positive corporate image, and bolster competitiveness. Private enterprises, on the other hand, should enhance awareness and publicize smart city pilot policies, gaining a deep understanding of their goals and intentions, and actively align their operations with policy directives.

2)Government

To advance the trajectory of the green industry among small and medium-sized private enterprises and bolster enthusiasm for green transformation, these enterprises are encouraged to actively engage in industry collaboration and cooperation. This includes sharing resources and information, enhancing cooperation within the industry, and thereby boosting overall competitiveness. Acknowledging regional disparities, particularly the varying impacts of smart city policies, necessitates differentiated policy implementation.

Government initiatives should focus on implementing tailored policy support measures for digital infrastructure construction across different regions. In economically developed areas like the eastern region, where technological infrastructure is robust, priority should be given to integrating digital technologies within enterprises to enhance efficiency and productivity, facilitating green transformation. Conversely, in the central and western regions, initial efforts should prioritize providing technical support such as capital and hardware to enhance digital technology infrastructure among enterprises and promote green transformation.

Additionally, fostering cross-regional cooperation is crucial. Governments can encourage enterprises in the eastern region to collaborate across regions with counterparts in the central and western regions. This collaboration facilitates the exchange of advanced technologies and experiences, thereby accelerating the development of the green industry in these regions and raising the overall standard of green industry nationwide.

Through strategic cross-regional cooperation, optimal resource allocation can be achieved, leading to accelerated growth of the green industry in the central and western regions and an overall improvement in the national green industry landscape.

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