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Measurement of Digital Economy Development Level and Regional Differences in Shandong Province Based on Logistic-Entropy Weight Method

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Abstract

Against the backdrop of the digital economy becoming a core engine for high-quality regional economic development and Shandong accelerating the construction of a digital province, this paper identifies the industrial life cycle of Shandong's digital economy from 2011 to 2025 using the Logistic model. An evaluation index system is established covering four dimensions: digital infrastructure, digital industrialization, industrial digitalization, and digital governance. With the entropy weight method, it measures the digital economy development level of 16 prefecture-level cities in Shandong from 2020 to 2024 and analyzes its temporal and spatial evolution.

The results show that Shandong's digital economy is in the early growth stage, with a saturation value of 1,3986.552 billion yuan and projected growth peak in 2027. All cities achieved steady development, while the gap between leading and lagging cities widened slightly with an obvious Matthew effect. A stable three-tier spatial pattern has formed, featuring a layout of stronger east, weaker west, faster south, slower north. Industrial digitalization and digital governance serve as core driving forces, and the growth driver has shifted from infrastructure to industrial integration and technological innovation. Corresponding policy suggestions are put forward to support the balanced and high-quality development of Shandong's digital economy.

1. Introduction

The 20th Third Plenary Session of the CPC proposed establishing a sound institutional system for the deep integration of the real economy and the digital economy, making strategic arrangements for constructing digital economy mechanisms, digital industrialization, and improving industrial digitalization policies(Wang,2025). As a major economic and populous province in China, Shandong has achieved steady growth in economic aggregate since the reform and opening-up, becoming a crucial growth pole for national economic development. The digital economy, serving as a new engine for Shandong's high-quality regional economic development, demonstrates robust vitality and promising prospects. Shandong Province places high importance on digital economy development, issuing the "Opinions on Accelerating High-Quality Digital Economy Development" in 2024, which sets a target for the digital economy to exceed 50% of GDP (Zheng et al.,2025; Ding et al., 2025c; Li et al., 2026). By 2025, Shandong's digital economy is projected to reach 5.2 trillion yuan, accounting for over 49% of its GDP, becoming the core pillar of regional economic development. Shandong's digital economy has entered a phase of comprehensive expansion, progressively advancing toward deep integration of digital industrialization, industrial digitalization, and digital value realization (Jin,2025).

At the current stage, scholars' research on measuring digital economy development primarily encompasses three dimensions: aggregate-level measurement (Liu et al.,2025; Ding et al.,2025a), provincial-level measurement (Bian,2025; Xu,2025), and municipal-level measurement (Cheng,2025; Zeng et al.,2026). The research perspectives focus on the driving effects of the digital economy on green development (Zhu et al.,2025; Zhao et al.,2026) and the upgrading of modern service industries (Tan et al.,2025), as well as the spatiotemporal differentiation of the digital economy (He et al.,2023). Regarding the construction of digital economy indicator systems, scholars often approach it from dimensions such as digital infrastructure, digital industrialization, industrial digitalization, digital innovation (Tang,2025; Hao et al., 2026), digital governance (Pan et al.,2021; Ma et al., 2026; Huang et al.,2026), enterprise digitalization, and economic aggregate (Sun et al.,2023), forming a relatively comprehensive research framework.

Building on existing scholarly research, this paper first employs the Logistic model to determine the industrial life cycle stage of Shandong Province's digital economy development, clarifying its overall developmental phase. Next, an evaluation index system is constructed across four dimensions—digital infrastructure, digital industrialization, industrial digitalization, and digital governance—to measure the digital economy development levels of Shandong's 16 prefecture-level cities from 2020 to 2024 using the entropy weight method. The spatiotemporal differentiation characteristics of Shandong's digital economy are then analyzed.

All data used in this study are sourced from the Shandong Statistical Yearbook, prefecture-level city statistical yearbooks, statistical bulletins, municipal government work reports, as well as official websites of agricultural and rural bureaus and local news portals. Some data were derived through mathematical calculations. The data are reliable, with consistent statistical standards.

2. Analysis of Development Stage Positioning in Shandong's Digital Economy

The methods for determining industrial development stages mainly include the growth rate method, growth curve method, and comprehensive indicator evaluation method. Among these, the growth curve method fits and predicts industrial development trends through functional models, offering advantages such as easy data acquisition and low modeling difficulty, making it widely applicable in industrial lifecycle research(Chen et al., 2022; Ding et al., 2025b). This study employs the

Logistic curve to fit the development stages of Shandong's digital economy. This model effectively captures the S-shaped growth characteristics of industries—from the "emerging phase" to the "growth phase" and finally the "maturity phase"—aligning well with the developmental patterns of Shandong's digital economy.

The functional expression of the Logistic curve is:

$$Y_t = \frac{L}{1+ae^{-bt}} \tag{1}$$

where:
Y_t = measured overall development level of Shandong's digital economy in period t (in billion yuan)
t= time span of the study period (with 2011 as the initial value at t=1)
L= saturation value of digital economy development (in billion yuan), representing the theoretical upper limit of industrial growth
a, b = parameters to be estimated (b > 0), reflecting the growth rate of the industry

This study selects the measured overall development level of Shandong's digital economy from 2011 to 2025 as sample data (Figure 1). Observation of the data trend reveals that the 2019 data significantly deviates from the overall growth pattern, attributable to adjustments in statistical standards and short-term impacts during the initial phase of the pandemic. To enhance the model's fitting accuracy, the 2019 outlier was excluded prior to model fitting.

Table 1.Parameter Mapping of Shandong's Digital Economy Development Phases

Time Nodes	$(0, T_1)$	(T_1, T_0)	(T_0, T_2)	$(T_2, +\infty)$
Industry Development Stages	Formation Period	Early Growth Stage	Late Growth Stage	Maturity Stage
Form of Y_t	Slow Growth	Accelerated Growth	Decelerated Growth	Stable
Industrial Growth Rate	$\left(0, \frac{Lb}{6}\right)$	$\left(\frac{Lb}{6}, \frac{Lb}{4}\right)$	$\left(\frac{Lb}{4}, \frac{Lb}{6}\right)$	$\left(\frac{Lb}{6}, 0\right)$
Nodes	$\left(\frac{\ln a - (\ln 2 + \sqrt{3})}{b}, \frac{L(3-\sqrt{3})}{6}\right)$	$\left(\frac{\ln a}{b}, \frac{L}{2}\right)$	$\left(\frac{\ln a + (\ln 2 + \sqrt{3})}{b}, \frac{L(3+\sqrt{3})}{6}\right)$	

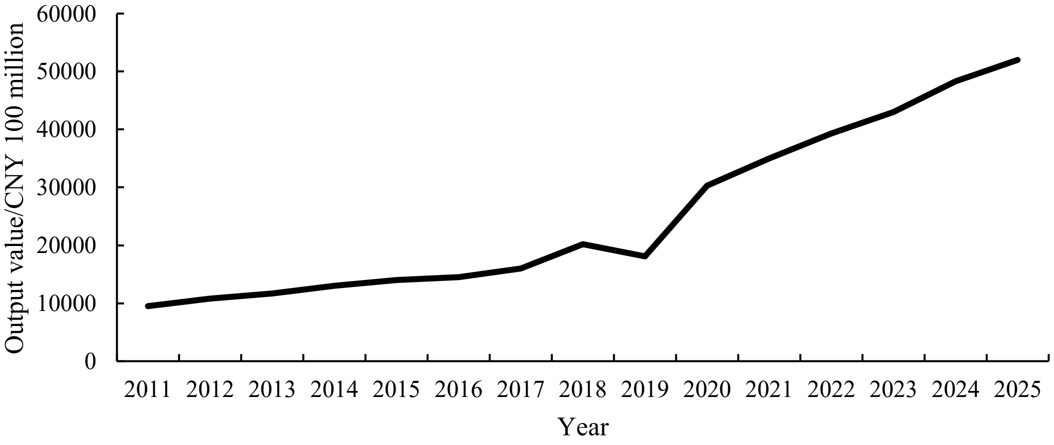

Figure 1. Assessment of Shandong's Digital Economy Development Level

The initial saturation value (L) of Shandong's digital economy development scale was first determined using the four-point method. Subsequently, nonlinear regression fitting was performed on the sample data (after outlier removal) using SPSS statistical analysis software, yielding the following model parameter estimates and goodness-of-fit indicators:

Saturation value (L): RMB 13,986.552 billion;Parameter a = 20.3660;Parameter b = 0.1686;
The model demonstrates excellent fit with:Coefficient of determination (R^2) = 0.9882;F-statistic = 461.91;P-value < 0.05.

These results indicate the model passes significance testing at the 95% confidence level and effectively reflects the development trajectory of Shandong's digital economy.Based on the industrial lifecycle classification rules of the Logistic curve model and the fitted parameters, we calculated the temporal nodes and scale ranges for each development phase of Shandong's digital economy. The specific phase division results are presented in Table 2.

Table 2.Phase Delineation of Shandong's Digital Economy Development (2019 Outlier Removed)

Stage	**Time Interval（t）**	**Corresponding Period**	**Yt Scale interval(CNY 100 million)**
Formation Period	(0,T1)=(0,3.49)	2011-Mid 2013	(0,29557.06)
Early Growth Stage	(T1,T0)=(3.49,17.88)	Mid 2013-Late 2027	(29557.06,69932.76)
Late Growth Stage	(T0,T2)=(17.88,32.26)	Late 2027—March 2042	(69932.76,110308.46)
Maturity Stage	(T2,+∞)=(32.26,+∞)	March 2042 onwards	(110308.46,139865.52)

Based on the Logistic model fitting results after excluding the 2019 outlier, the development of Shandong's digital economy can be divided into four distinct phases:

1. Formation Period (2011 - mid 2013)

During this incubation stage, Shandong's digital economy remained in its infancy, with total output value growing gradually from 950 billion yuan to 2.96 trillion yuan. Digital infrastructure was initially deployed, while internet and mobile communication services maintained relatively low penetration rates. The integration between digital technologies and the real economy was limited, with an immature digital ecosystem. Growth rates, though modest, demonstrated a steady upward trend.

2. Early Growth Period (mid 2013 - late 2027)

This acceleration phase witnessed rapid expansion from 2.96 trillion yuan to 6.99 trillion yuan, with growth rates progressively increasing and projected to peak by late 2027. Currently in this early growth stage, Shandong has achieved fundamental digital infrastructure coverage. The driving effects of digital industrialization and industrial digitalization have become pronounced, with emerging sectors like e-commerce, logistics, and industrial internet developing vigorously. The digital economy has emerged as the core engine of regional economic growth.

3. Late Growth Period (late 2027 - March 2042)

Characterized by gradually decelerating growth, the digital economy will expand from 6.99 trillion yuan to 11.03 trillion yuan during this phase. Deeper integration with the real economy will occur, with the digital industry transitioning from scale expansion to refined development. Growth drivers will shift from factor inputs to technological innovation.

4. Maturity Period (starting March 2042)

Entering this stabilization phase, Shandong's digital economy will approach its saturation value of 13.99 trillion yuan with stabilized growth rates. The digital and real economies will achieve comprehensive integration, while digital industrialization patterns will become consolidated.

3. Spatiotemporal Disparities Analysis of Digital Economy Development in Shandong Province

Having established that Shandong's digital economy is in its early growth stage, this study develops a comprehensive evaluation index system at the prefecture-level city scale. Using the entropy weight method, we measure the digital economy development levels across Shandong's 16 prefecture-level cities from 2020 to 2024. The analysis examines disparities through temporal, spatial, and structural dimensions to provide empirical evidence for future policy formulation. Building upon research by Tang (2025), Pan (2021), Sun (2023), and considering both the core essence of digital economy and Shandong's industrial realities, we construct an evaluation system comprising four dimensions: (1) digital infrastructure, (2) digital industrialization, (3) industrial digitalization, and (4) digital governance. The system includes 8 secondary indicators (detailed in Table 3). Indicator selection follows principles of scientific rigor, representativeness, and operational feasibility. Each secondary indicator effectively reflects corresponding dimensional development levels, with all data obtainable through public channels or mathematical calculations, ensuring unified standards and cross-comparability.

Table 3.Evaluation Index System for Shandong's Digital Economy Development

System Layer	Primary Indicator	Secondary Indicator	Indicator Nature	Indicator Description
Shandong Digital Economy Development Level	Digital Economy Infrastructure	Number of Internet Broadband Access Subscribers	Positive	Reflects the scale of coverage of basic digital services in prefecture-level cities
		Number of Mobile Phone Users	Positive	Reflects the penetration rate of mobile communication services in prefecture-level cities
	Digital Industrialization	Total Telecommunications Business Volume	Positive	Reflects the core development scale of the digital industry in prefecture-level cities
		Proportion of Enterprises with E-commerce Transaction Activities	Positive	Reflects the penetration rate of enterprise digital transformation in prefecture-level cities

System Layer	Primary Indicator	Secondary Indicator	Indicator Nature	Indicator Description
	Industrial Digitization	Postal Express Business Volume	Positive	Reflects the digital development level of commercial logistics in prefecture-level cities
		E-commerce Sales Volume	Positive	Reflects the degree of integration between the digital economy and commercial industry in prefecture-level cities
	Digital Governance	Number of Patents Granted	Positive	Reflects the output capacity of digital technology innovation in prefecture-level cities
		Internal R&D Expenditure	Positive	Reflects the supporting capacity of scientific and technological innovation investment in the digital economy of prefecture-level cities

This paper adopts the entropy weight method to calculate indicator weights. As an objective weighting method, it determines weights based on the degree of dispersion of indicator data, which can effectively avoid the bias of subjective weighting and is suitable for the measurement research of regional economic development levels(Si,2023). The core calculation steps of the entropy weight method are as follows. All indicators are positive indicators, and the extreme value standardization method is used to eliminate dimensional effects by converting the data to the interval [0,1]. Let the sample set be $X = (x_{ij})_{m \times n}$, where m is the number of samples ($m = 16$ in this paper, i.e., 16 prefecture-level cities), n is the number of indicators ($n = 8$ in this paper, i.e., 8 secondary indicators), and x_{ij} represents the value of the i-th sample on the j-th indicator.

1.Data Standardization:

The original data of each indicator are processed using max-min standardization to obtain standardized values s_{ij}, which are transformed into values within the interval $[0,1]$. Since the measurement of digital economy development is positively correlated with these indicators, the calculation formula is:

$$s_{ij} = \frac{x_{ij} - \min(x_j)}{\max(x_j) - \min(x_j)} \tag{2}$$

where s_{ij} is the standardized value of the i-th sample on the j-th indicator; $\max(x_j)$ and $\min(x_j)$ are the maximum and minimum values of the j-th indicator, respectively.

2.Calculate Indicator Proportions Using Standardized Data:

$$p_{ij} = \frac{r_{ij}}{\sum_{i=1}^{m} s_{ij}} \tag{3}$$

where m is the sample size, and p_{ij} is the proportion value of the i-th sample on the j-th indicator.

3.Calculate the Entropy Value of Each Indicator:

$$e_j = -\frac{1}{\ln m}\sum_{i=1}^{m} p_{ij} \cdot \ln p_{ij} \tag{4}$$

where e_j is the entropy value of the j-th indicator, with $e_j \in [0,1]$. A smaller entropy value indicates a higher degree of dispersion of the indicator and a greater ability to distinguish evaluation results.

4.Calculate the Difference Coefficient:

$$d_j = 1 - e_j \tag{5}$$

where d_j is the difference coefficient of the j-th indicator. A larger difference coefficient indicates a stronger distinguishing ability of the indicator.

5.Calculate Indicator Weights:

$$w_j = \frac{d_j}{\sum_{j=1}^{n} d_j} \tag{6}$$

where w_j is the weight value of the j-th indicator, satisfying $\sum_{j=1}^{n} w_j = 1$.

6.Calculate the Comprehensive Score:

$$F_i = \sum_{j=1}^{n} w_j \cdot s_{ij} \tag{7}$$

where F_i is the comprehensive score of the digital economy development level of the i-th sample, with $F_i \in [0,1]$. A higher score indicates a stronger development level.

3.1 Determination of Indicator Weights

This paper adopts the entropy weight method to calculate the weights of eight secondary indicators of the digital economy across 16 prefecture-level cities in Shandong Province from 2020 to 2024. The annual weight results are presented in Table 4. In terms of primary indicators, the weights rank in descending order as industrial digitalization, digital governance, digital economy infrastructure and digital industrialization. It reveals that industrial digitalization serves as the core driving force for the development of the digital economy in Shandong Province, while digital governance acts as a vital support.

Table 4.Weights of Evaluation Indicators for Digital Economy Development in Shandong Province

Primary Indicator	Secondary Indicator	2020	2021	2022	2023	2024
Industrial Digitization	Postal Express Business Volume	0.185	0.195	0.197	0.198	0.198
	E-commerce Sales Volume	0.139	0.140	0.141	0.141	0.141

Digital Governance	Number of Patents Granted	0.107	0.105	0.105	0.105	0.105
	Internal R&D Expenditure	0.163	0.162	0.163	0.163	0.164
Digital Economy Infrastructure	Number of Internet Broadband Access Subscribers	0.105	0.103	0.103	0.103	0.103
	Number of Mobile Phone Users	0.099	0.097	0.097	0.097	0.097
Digital Industrialization	Total Telecommunications Business Volume	0.111	0.107	0.107	0.108	0.108
	Proportion of Enterprises with E-commerce Transaction Activities	0.091	0.091	0.091	0.091	0.091

The weights of industrial digitization indicators have seen a slight year-on-year increase, making them the core driving indicators. Under industrial digitization, the weights of postal express business volume and e-commerce sales volume remained stable within the intervals [0.185, 0.198] and [0.139, 0.141] respectively, with a slight upward trend year by year. Notably, postal express business volume was the highest-weighted indicator among all metrics, reaching 0.198 in 2024. This indicates the rapid development of logistics digitization in Shandong Province, the continuous deepening of integration between the digital economy and the commercial trade industry, and its role as a core differentiating indicator driving digital economy development across prefecture-level cities.

The weights of digital governance indicators remained relatively stable. Under digital governance, the weight of internal R&D expenditure stayed within the range [0.162, 0.164], while the weight of patent grants stabilized around 0.105. This demonstrates that scientific research investment serves as a crucial pillar for Shandong’s digital economy development. All prefecture-level cities have consistently increased R&D investment, making scientific research and innovation capabilities a core competitive advantage for the province’s digital economy.

The weights of digital economy infrastructure indicators experienced a slight decline. Under digital economy infrastructure, the weights of internet broadband access subscribers and mobile phone users showed a moderate downward trend, stabilizing at approximately 0.103 and 0.097 respectively. This reflects that digital infrastructure construction in Shandong’s prefecture-level cities has achieved full coverage, with regional gaps in infrastructure continuing to narrow.

Digital industrialization indicators exhibited low and stable weights, requiring further development momentum. Under digital industrialization, the weights of total telecommunications business volume and the proportion of enterprises with e-commerce transaction activities remained relatively stable, ranking among the lowest of all indicators. This suggests that regional differences in the core scale of the digital industry and the penetration rate of enterprise digital transformation are small in Shandong. While digital industrialization development is relatively balanced across regions, its overall scale remains insufficient, making it a bottleneck area for the province’s digital economy growth.

3.2 Comprehensive Evaluation Results of Digital Economy Development Levels of 16 Prefecture-Level Cities in Shandong Province

This paper employs the entropy weight method to calculate the comprehensive scores and rankings of digital economy development levels for the 16 prefecture-level cities in Shandong Province from 2020 to 2024 (Table 5). The comprehensive scores range within [0,1], where a higher score indicates a higher level of digital economy development; the rankings reflect the relative development position of each prefecture-level city within the province.

Table 5.Comprehensive Scores and Rankings of Digital Economy Development Level of Prefecture-level Cities in Shandong Province, 2020–2024

Rank	City	2020 Score	City	2021 Score	City	2022 Score	City	2023 Score	City	2024 Score
1	Qingdao	0.8972	Qingdao	0.8997	Qingdao	0.9021	Qingdao	0.9053	Qingdao	0.9087
2	Linyi	0.7215	Linyi	0.7388	Linyi	0.7513	Linyi	0.7621	Linyi	0.7735
3	Jinan	0.7189	Jinan	0.7336	Jinan	0.7489	Jinan	0.7587	Jinan	0.7692
4	Weifang	0.5387	Weifang	0.5463	Weifang	0.5527	Weifang	0.5592	Weifang	0.5658
5	Yantai	0.4093	Yantai	0.4156	Yantai	0.4218	Yantai	0.4276	Yantai	0.4332
6	Jining	0.3365	Jining	0.3429	Jining	0.3492	Jining	0.3548	Jining	0.3605
7	Heze	0.2572	Heze	0.2618	Heze	0.2673	Heze	0.2725	Heze	0.2776
8	Dezhou	0.2376	Dezhou	0.2417	Dezhou	0.2458	Dezhou	0.2497	Dezhou	0.2539
9	Zibo	0.1798	Zibo	0.1833	Zibo	0.1876	Zibo	0.1912	Zibo	0.1947
10	Liaocheng	0.1687	Tai'an	0.1721	Tai'an	0.1753	Tai'an	0.1789	Tai'an	0.1825
11	Tai'an	0.1682	Liaocheng	0.1718	Liaocheng	0.1749	Liaocheng	0.1781	Liaocheng	0.1813
12	Binzhou	0.1095	Binzhou	0.1119	Binzhou	0.1142	Binzhou	0.1163	Binzhou	0.1184
13	Weihai	0.0901	Weihai	0.092	Weihai	0.0937	Weihai	0.0952	Weihai	0.0968
14	Zaozhuang	0.0472	Zaozhuang	0.0481	Zaozhuang	0.0493	Zaozhuang	0.0501	Zaozhuang	0.0509
15	Rizhao	0.0267	Rizhao	0.0272	Rizhao	0.0281	Rizhao	0.0287	Rizhao	0.0293
16	Dongying	0.0181	Dongying	0.0185	Dongying	0.0192	Dongying	0.0198	Dongying	0.0204

From a temporal perspective, the comprehensive scores of the digital economy of all 16 prefecture-level cities in Shandong Province maintained positive growth for five consecutive years from 2020 to 2024. This reveals that the digital economy across the province is developing steadily and has become a core engine for the high-quality economic development of Shandong. Nevertheless, the growth rates of the digital economy vary remarkably among different cities. The three leading cities, namely Qingdao, Linyi and Jinan, registered the highest scores, which rose from 0.8972, 0.7215 and 0.7189 in 2020 to 0.9087, 0.7735 and 0.7692 in 2024 respectively. While cities including Dongying, Rizhao and Zaozhuang also achieved score growth, their growth rates remained low. The development gap between these cities and the leading ones widened slightly, and the regional disparity in digital economy development kept expanding.

From a spatial perspective, the rankings of digital economy development among the 16 prefecture-level cities experienced minor fluctuations during 2020–2024, leading to a relatively stable spatial pattern divided into three development tiers.

The first tier consists of Qingdao, Linyi and Jinan. These three cities have ranked top three in the province for five successive years. As the major contributors to Shandong's digital economy, their comprehensive scores all exceed 0.7, far higher than those of other cities. The second tier includes Weifang, Yantai and Jining, with comprehensive scores ranging from 0.3 to 0.6, acting as the backbone of regional digital economy development. The third tier covers ten cities such as Heze, Dezhou and Zibo, whose scores are all below 0.3 and rankings fluctuate moderately between 7th and 16th. Specifically, Heze saw a steady increase in scores and held the 7th place for five years running. Tai'an climbed slightly from the 11th position in 2020 to the 10th in 2024. By contrast, the underdeveloped cities in northern and southern Shandong represented by Dongying, Rizhao and Zaozhuang remained at the bottom of the ranking throughout the period. Constrained by weak development foundations and low levels of industrial digitization and digital governance, these cities have become a major obstacle to the balanced development of the digital economy across the province.

From the structural perspective of evaluation indicators, the disparities in digital economy development across Shandong's cities are primarily driven by two core indicators: industrial digitization and digital governance. In comparison, digital economy infrastructure and digital industrialization exert a limited driving effect. It can be concluded that the competition focus of digital economy development in Shandong has shifted from infrastructure-driven development to industrial integration and technological innovation-driven development.

4. Policy Recommendations for High-Quality Development of the Digital Economy in Shandong Province

4.1. Strengthen the Leading Role of Core Growth Poles and Build a Demonstration Zone for Coordinated Development

Relying on Qingdao, Jinan and Linyi, the three prefecture-level cities with prominent advantages in digital economy development, we shall foster core growth poles of the provincial digital economy to drive the interactive development of surrounding cities. As a separately planned city, Qingdao can give full play to its policy and geographical advantages, focus on developing digital trade, cross-border e-commerce, industrial Internet and other sectors, expand the overall scale of the digital economy, and build a benchmark for digital industrialization across the province. As the provincial capital, Jinan shall leverage its concentrated scientific research resources, continuously increase investment in R&D expenditure, and deepen industry-university-research cooperation among universities, research institutions and enterprises, so as to consolidate the foundation of scientific and technological innovation for the development of Shandong's digital economy. As a national commercial and logistics hub, Linyi shall prioritize the layout of characteristic digital formats such as smart logistics and live-streaming e-commerce, and steadily advance the digital transformation of traditional commercial industries.

4.2. Implement Targeted Policies to Shore up Weak Links and Accelerate the Catch-up of Underdeveloped Cities

For cities with relatively backward digital economy development including Dongying, Rizhao and Zaozhuang, differentiated supporting policies shall be formulated in accordance with their respective shortcomings. Priority shall be given to remedying two major weaknesses: lagging industrial digital transformation and inadequate digital governance capacity, so as to narrow the regional development gaps. Local small and medium-sized enterprises engaged in e-commerce and digital services shall be vigorously cultivated. These cities are encouraged to undertake the industrial transfer of digital industries and commercial logistics from leading cities such as Jinan and Qingdao, promote the in-depth integration of digital technologies with local traditional characteristic industries, and stimulate the vitality of local industrial digitalization.

4.3. Improve the Mechanism for Regional Coordinated Development and Establish a New Pattern of All-round Development

First, overall planning for the digital economy development of the whole province shall be optimized. In light of resource endowments, industrial foundations and geographical advantages of each city, we shall clarify their development orientations, core goals and key tasks in a targeted manner, guide differentiated and featured development, and avoid low-level homogeneous competition. Second, platforms for paired assistance between cities and joint industrial construction and sharing shall be established. This will facilitate targeted cooperation between advanced cities and underdeveloped ones, and realize the cross-regional flow and sharing of digital infrastructure, scientific and technological innovation resources as well as industrial projects.

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