
Configurational Pathways to SRDI Enterprise Growth in China's Digital Economy: A fsQCA Approach

Peipei Qi¹, Aimi Fadzirul Kamarubahrin²

¹City University Malaysia, City Graduate School,
Jalan 51A/223, Petaling Jaya, Malaysia

²City University Malaysia, City Graduate School, Malaysia
Universiti Putra Malaysia, Faculty of Forestry and Environment, Malaysia

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Abstract

The business environment serves as a critical institutional foundation for cultivating and fostering the innovative development of specialized, refined, unique, and new (SRDI) enterprises, which are innovative small and medium-sized enterprises (SMEs) focusing on niche technologies and high-value specialization. However, existing research has paid insufficient attention to the mechanisms through which the business environment influences SRDI cultivation within the digital economy. Guided by configurational thinking, this study employs fuzzy-set qualitative comparative analysis (fsQCA) to identify how different combinations of digital and traditional environmental factors jointly drive SRDI SME development, thereby providing a theoretically coherent and methodologically rigorous examination of multiple causal pathways. The analysis reveals several effective cultivation configurations characterized by diversity and balance, including the digital comprehensive leading type, digital innovation–legal coordination type, and digital core-driven type. These results demonstrate that digital transformation functions as the central mechanism linking environmental configurations to SRDI growth, where digital elements such as finance, innovation, and e-government complement or compensate for weaknesses in traditional legal and cultural contexts. The study extends configurational theory by empirically illustrating how synergistic and non-linear interactions among environmental elements can generate multiple equifinal pathways toward enterprise upgrading. Furthermore, it constructs a binary interaction framework integrating the digital economy and traditional environment, offering a new analytical lens for understanding SME innovation and policy design. Practically, the findings suggest that regions should adopt context-specific cultivation paths, strengthen digital ecosystem development, and promote the integration of traditional institutional advantages with digital transformation to advance differentiated industrial innovation strategies.

Keywords: digital economy; business environment; SRDI enterprises; innovative SMEs; fsQCA; configurational thinking; digital transformation

1. Introduction

The rapid expansion of China's digital economy, which surpassed 60 trillion yuan and accounted for over 40% of GDP in 2024, underscores the critical role of a supportive business environment in cultivating "SRDI" (Specialized, Refined, Distinctive, and Innovational) small and medium-sized enterprises (SMEs). As vital contributors, providing over 50% of tax revenue and 60% of employment, SMEs are a key engine of economic growth. In response, the Chinese government has launched major policy initiatives, such as the 14th Five-Year Plan for Promoting SME Development, to optimize this environment and steer SMEs toward high-end, intelligent, and green transformation. Nevertheless, SRDI SMEs continue to face significant hurdles, including financing constraints, limited innovation capacity, and intense market competition, underscoring the urgency for a more optimized business landscape.

Existing literature primarily examines the influence of isolated factors on SME development, with scant attention paid to the synergistic effects of business environment elements within the digital economy. Furthermore, empirical studies focusing on the uniquely Chinese "SRDI" enterprise cohort remain limited, especially systematic investigations into pathways for business environment optimization. Addressing this gap, our study innovatively applies fsQCA (fuzzy-set Qualitative Comparative Analysis) to identify the configurational pathways of business environment factors that drive SRDI SME growth. Aligned with UN Sustainable Development Goal 8 (Decent Work and Economic Growth), this research aims to provide policymakers with a scientific basis to foster the high-quality development of SRDI SMEs, thereby promoting sustainable economic and social progress.

2. Literature review

2.1 Business environment in the context of digital economy

The rapid ascent of the digital economy is fundamentally transforming the business environment, profoundly impacting enterprise survival and development. Within this new paradigm, the quality of the digital business landscape has become a critical indicator of regional economic vitality and competitiveness. Foundational digital infrastructure, such as high-speed internet and 5G networks, serves as a cornerstone for optimizing this environment and enhancing enterprise operational efficiency (Li et al., 2024). Concurrently, the widespread adoption of digital government services has significantly reduced administrative burdens and improved public service delivery (Martins & Veiga, 2022), while robust data governance frameworks facilitate the secure flow and value realization of data assets (Sun et al., 2024). Despite these advancements, persistent challenges including the digital divide, cybersecurity threats, and lagging regulatory innovation demand attention (Inegbedion, 2021; Saeed et al., 2023; Li et al., 2023). Addressing these issues necessitates coordinated efforts from government, industry, and society to bolster SME digital transformation (Chen et al., 2021), build resilient digital ecosystems, and comprehensively enhance the business environment. Crucially, while the digital economy introduces new dimensions, traditional factors such as a sound legal framework for property rights protection (Zhou et al., 2017) and an open, supportive cultural environment (Garcia-Rodriguez et al., 2017) remain indispensable for fostering innovation. Although existing

studies provide a valuable multidimensional framework, research on the synergistic interaction between digital and traditional factors in shaping enterprise development remains limited, underscoring a critical gap for future inquiry.

2.2 SRDI enterprise cultivation

SRDI enterprises are pivotal drivers of industrial growth and technological innovation. Within the digital economy, however, their trajectory is shaped by a complex interplay of enablers and obstacles. Critical growth facilitators include robust university-industry collaboration (Jia et al., 2023), strategic positioning within industrial clusters (Fulgence et al., 2023), proactive local government support (Aslam et al., 2023), and the strategic adoption of digital technologies (Melo et al., 2023). Despite these supports, SRDI enterprises face disproportionately greater challenges than larger corporations in financing, human capital, and technological capabilities during digital transformation. To overcome these hurdles, they must leverage digital platforms for global market expansion, safeguard their intellectual property and core technologies (Jiang et al., 2023), and explore innovative online financing models while optimizing their global operational strategies (Suchek et al., 2023). Concurrently, governments are urged to enact targeted policies, such as establishing dedicated development funds and providing technical assistance (Nguyen et al., 2023). Emerging research, including the work of Li Zheng et al. (2024), examines how the digital business environment influences the innovative performance of SRDI enterprises, providing a foundation for improved policy and strategy.

While existing studies offer valuable insights into the characteristics and growth patterns of SRDI enterprises, several critical questions remain unresolved. For instance, is any single business environment factor in the digital economy a necessary condition for their growth? What specific configurations of these factors most effectively promote or conversely, hinder their development? Furthermore, research on how different elements of the digital business environment synergistically interact to influence SRDI enterprises, and how these firms sustain a competitive advantage within it, remains underexplored.

3. Research framework

From a configurational perspective, the business environment comprises an interconnected set of factors that collectively shape enterprise outcomes (Li, 2022). Grounded in systems theory, scholars increasingly conceptualize it as a complex system critical to fostering innovation. A prevailing view holds that six elements, including digital infrastructure, digital innovation ecosystems, digital financial services, digital government services, legal frameworks, and cultural environments, collectively constitute the complex business environment that underpins the cultivation of SRDI enterprises in the digital economy (Autio et al., 2018; Nambisan et al., 2019; Vargas-Hernandez et al., 2024). Building on this foundation, this study examines these six core elements to investigate the external resource configurations that facilitate SRDI enterprise growth. The specific theoretical model is presented in Figure 1.

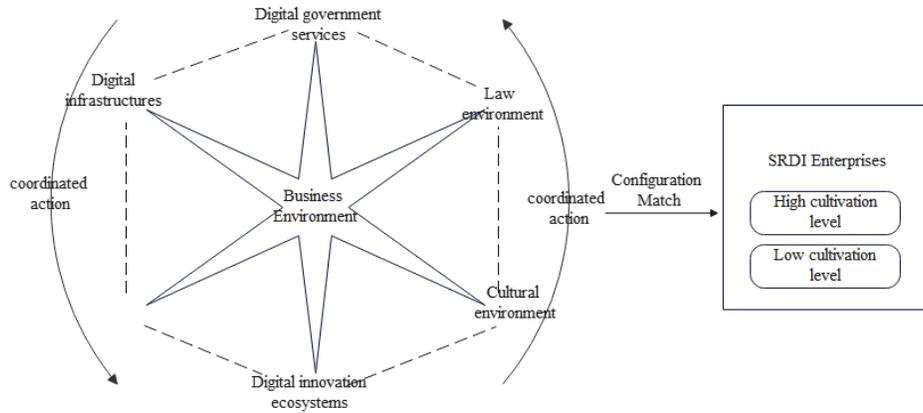


Figure 1. Theoretical model

3.1 Identify subsections

In the digital economy, digital infrastructure forms the foundation of the business environment and serves as a critical enabler for the growth of SRDI enterprises. Robust digital infrastructure enhances information accessibility, lowers operational and communication costs, and bolsters the capacity of small enterprises to utilize digital tools effectively (Xiu, 2024). Conversely, inadequate or obsolete infrastructure severely constrains corporate operations and expansion (Czernich et al., 2011), widens the digital divide, compromises cybersecurity, and limits access to essential digital resources (Katz & Koutroumpis, 2014). Consequently, digital infrastructure presents a dualistic character, simultaneously enabling and potentially hindering the advancement of SRDI enterprises.

3.2 Digital innovation ecosystem

The digital innovation ecosystem constitutes a collaborative network of enterprises, governments, research institutions, and users, integrated through digital tools and platforms (Sussan & Acs, 2017). Within this framework, SRDI enterprises can harness digital platforms to partner with other firms, research teams, and customers, forming dynamic networks that accelerate innovation and improve market responsiveness. Furthermore, emerging technologies such as cloud computing, big data, and artificial intelligence enable these enterprises to optimize their innovation efficiency by providing access to advanced research tools and computing power more cost-effectively (Nambisan et al., 2019). This ecosystem also facilitates cross-border collaboration and novel business model exploration, thereby creating significant growth opportunities for SRDI enterprises (Autio et al., 2018).

3.3 Digital financial services

Big data and artificial intelligence empower financial institutions to assess corporate risk with greater precision, refine credit allocation, and enhance capital distribution efficiency (Jagtiani & Lemieux, 2018). Concurrently, innovative services such as digital payments and supply chain finance reduce transaction costs, accelerate capital circulation, and improve corporate cash

management capabilities (Gomber et al., 2017). By enhancing financial accessibility and operational efficiency while mitigating traditional financing challenges, digital financial services expand the range of financial products available to SMEs (Haddad & Hornuf, 2019), thereby cultivating a more supportive environment for the growth of SRDI enterprises (Ozili, 2018).

3.4 Digital government services

Digital government services streamline administrative procedures, expedite operational efficiency, and reduce costs, thereby fostering a more conducive environment for SRDI enterprise development (Janowski, 2015). Through digital platforms, governments can ensure the transparent dissemination of policies, regulations, and market information, which empowers firms to make well-informed strategic decisions (Bertot et al., 2016). Furthermore, big data-driven intelligent services allow for the provision of tailored support that addresses the specific needs of SRDI enterprises (Gasco-Hernandez et al., 2018). Moreover, sophisticated digital governance initiatives promote the enhancement of digital literacy and application skills, encouraging SRDI enterprises to adopt digital tools and thereby strengthen their innovation capabilities (Twizeyimana & Andersson, 2019).

3.5 Legal environment

A robust legal environment is foundational to the success of SRDI enterprises, providing the necessary conditions for their growth and stability. A sound legal framework, firstly, safeguards intellectual property, encouraging firms to invest in research and development by ensuring their unique innovations are protected. This security enhances their willingness to cultivate specialized technical capabilities (Zhao et al., 2024). Secondly, fair competition laws are crucial, as they prevent market monopolization by larger firms and ensure a level playing field. This regulatory fairness allows SRDI enterprises to concentrate on their niche expertise and fully leverage their competitive advantages (Li et al., 2024). Finally, modern data protection laws facilitate secure digital transformation by establishing clear guidelines for the application of advanced technologies. Consequently, SRDI enterprises can confidently utilize big data and artificial intelligence for innovation, assured by a framework that manages risk (Xiong et al., 2024).

3.6 Humanistic environment

A supportive cultural environment exerts a profound influence on the development trajectory of SRDI enterprises. A commitment to quality motivates firms to pursue specialized excellence, leading to superior products and unique competitive advantages (Li et al., 2023). Similarly, an innovation-oriented culture stimulates entrepreneurship, enhances employee creativity, and fosters advancements in both technology and management practices (Sun et al., 2024). Furthermore, an open and inclusive atmosphere attracts diverse talent; the convergence of different knowledge systems and perspectives enhances collaborative efficiency, thereby strengthening innovation capabilities and competitive edge (Li et al., 2024). Underpinning this environment are two critical attitudes: respect for novel ideas and tolerance for failure. Together, these elements establish a secure ecosystem for innovation, enabling SRDI enterprises to develop cutting-edge solutions continuously.

The growth of SRDI enterprises is not driven by isolated factors but by the complex interplay of multiple elements including digital infrastructure, innovation ecosystems, financial and government services, legal frameworks, and cultural support. This study, therefore, employs a configurational approach, specifically Qualitative Comparative Analysis (QCA), to investigate how these business environment factors combine to promote SRDI development within the digital economy. The research aims to uncover the complex causal mechanisms and synergistic pathways that underpin their success.

4. Research methods and data sources

4.1 Research method

This study utilized fuzzy-set Qualitative Comparative Analysis (fsQCA) to investigate how configurations of business environment factors influence the growth of SRDI enterprises within China's digital economy. Unlike traditional econometric methods, which typically assume symmetrical relationships and net effects, fsQCA is methodologically adept at analyzing asymmetric relationships and identifying multiple equifinal pathways to a given outcome. This approach is particularly suited to clarify how synergistic combinations of digital infrastructure, innovation capacity, and government services drive SRDI growth. Furthermore, it provides critical insights into why policy effectiveness varies across different regional contexts.

4.2 Data sources

Data for the business environment elements were compiled from authoritative sources, including the National Bureau of Statistics, provincial statistical yearbooks, the China Digital Government Development Research Report, the China Regional Innovation Capacity Evaluation Report, and dedicated business environment research reports. The use of 2021 data for the six antecedent conditions is justified by both data availability and the recognized lagged effect these structural factors have on the business environment and enterprise performance (Peng et al., 2022). To operationalize the outcome variable of SRDI enterprise cultivation, this study uses the number of national-level "Little Giant" enterprises per province, as officially listed by the Ministry of Industry and Information Technology, with data current as of August 2023 (see Figure 2).

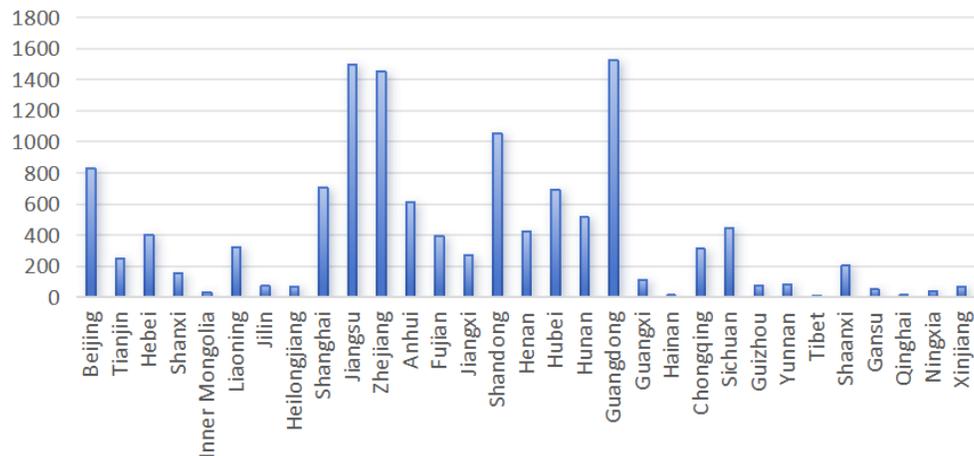


Figure 2. Distribution map of SRDI enterprises

4.3 Measurement and calibration of the data

4.3.1 Measurement of the outcome

This study quantifies the development of SRDI enterprises—innovative small and medium-sized enterprises (SMEs) focusing on niche, high-value technologies—at the provincial level by using the total number of “Little Giant” enterprises officially designated by China’s Ministry of Industry and Information Technology (MIIT) between 2019 and 2023. This variable captures the cumulative outcome of SRDI enterprise cultivation within each province and serves as a comprehensive indicator of regional success in fostering innovation-oriented SMEs. Given that environmental and institutional factors often exert lagged effects on enterprise development, the explanatory variables measured in 2021 are theoretically appropriate. This temporal setting reflects the fact that structural elements of the business environment—such as digital infrastructure, legal systems, and cultural norms—change gradually and influence enterprise formation with a time delay. Therefore, 2021 conditions can be reasonably interpreted as the contextual foundations shaping the cumulative SRDI outcomes observed during 2019–2023.

4.3.2 Measurement of the previous conditions

In line with the configurational perspective and systems theory, each condition was selected to represent a key dimension of the external business environment that collectively shapes enterprise growth. Specifically, six elements—digital infrastructure, digital innovation ecosystem, digital financial services, digital government services, legal environment, and cultural environment—reflect the intertwined “digital” and “traditional” subsystems of the business environment. These dimensions jointly operationalize the binary interaction framework of the digital economy and traditional environment, ensuring theoretical consistency with the configurational thinking that underpins this study.

(1) Digital Infrastructure: Following the methodology of Wang et al. (2021), digital infrastructure is operationalized using the entropy weight method to synthesize a composite index from key indicators, including internet penetration rate, mobile phone penetration rate, and the breadth of information transmission. The specific composition of this index is detailed in Table 1.

Table 1. China provincial digital infrastructure development level index system

Index	variables	Units	attributes		
Level of digital infrastructure development	Internet popularity	Number of Internet broadband access ports	Ten thousand Items	Positive	
		Number of Internet broadband access users	Ten thousand Items	Positive	
		Number of domain names owned by, per thousand people	Ten thousand Items	Positive	
		Number of Web sites per thousand people	Ten thousand Items	Positive	
		The popularity of mobile phones	Number of mobile phone base stations	Ten thousand Items	Positive
		Information transmission breadth	Fixed investment in the electronic information industry	100 million	Positive
			Number of IPV 4 / IPV 6 addresses	Ten thousand Items	Positive

Building on the work of Yang et al., the Entropy Weight Method (EWM) is employed to construct a comprehensive measurement from multiple indicators. EWM is an objective weighting technique that assigns weights based on the information entropy of each indicator; a lower entropy value signifies greater data variability and information content, thus resulting in a higher assigned weight. The procedure involves the following steps:

Step 1 : Data standardization (normalization)

The original data matrix is normalized to eliminate the influence of dimension. Let the original data matrix be $X = (x_{ij})_{m \times n}$, where m is the number of samples and n is the number of indicators. Positive indicators (the larger, the better):

$$r_{ij} = \frac{x_{ij} - \min(x_j)}{\max(x_j) - \min(x_j)} \quad (1)$$

Negative indicators (the smaller the better):

$$r_{ij} = \frac{\max(x_j) - x_{ij}}{\max(x_j) - \min(x_j)} \quad (2)$$

Step 2 : Calculate the entropy value e_j of the j -th indicator.

Calculate the proportion P_{ij} of the i -th sample under the j -th index:

$$P_{ij} = \frac{r_{ij}}{\sum_{i=1}^m r_{ij}} \quad (3)$$

If r_{ij} is less than or equal to 0, the whole shift is needed to avoid zero values.

Calculate the entropy value e_j of the j -th index:

$$e_j = -\frac{1}{\ln m} \sum_{i=1}^m P_{ij} \ln P_{ij} \quad (4)$$

where, \ln is the natural logarithm, and $e_j \in [0,1]$.

Step 3: Calculate the difference coefficient d_j

The larger the entropy value, the smaller the degree of dispersion of the index and the lower the weight. The difference coefficient is defined as:

$$d_j = 1 - e_j \quad (5)$$

Ste 4: Determine the weight w_j

The difference coefficient is normalized to obtain the weight of the j -th index:

$$w_j = \frac{d_j}{\sum_{j=1}^n d_j} \quad (6)$$

Step 5: Comprehensive score calculation

For each sample, calculate the weighted composite score:

$$S_i = \sum_{j=1}^n w_j r_{ij} \quad (7)$$

(2) Digital innovation ecosystem: The measured values of digital innovation ecosystems in this paper are sourced from the Evaluation Report of China's Regional Innovation Capability (2021).

(3) Digital financial services: The measured values of digital financial services in this paper are all derived from the Peking University Digital Financial Inclusion Index (Guo et al., 2020).

(4) Digital government services: The measurement values of digital government services in this paper are all sourced from the China Digital Government Development Research Report (2021).

(5) Legal environment: The measured values of the legal environment in this paper are all obtained from the Chinese Province Business Environment Report (2021).

(6) Cultural environment: The measured values of the cultural environment in this paper are all extracted from the Chinese Province Business Environment Report (2021).

4.3.3 Calibration

In fsQCA, calibration is the process of assigning set membership scores to cases (Schneider & Wagemann, 2012; Du & Jia, 2017). This involves transforming variables into fuzzy sets using theoretical and empirical knowledge, with membership scores ranging from 0 (full non-membership) to 1 (full membership). The three key calibration thresholds full membership, the crossover point, and full non-membership are defined by case characteristics to capture the degree to which a condition is present. Following established QCA practice (Fiss, 2011; Greckhamer, 2016), the 75th, 50th, and 25th percentiles were used as the anchors for these thresholds for both antecedent conditions and the outcome. Descriptive statistics and the specific calibration anchors are provided in Table 2.

Table 2. Description statistics and calibration of the variables

	Variable name	Calibration point			Descriptive statistics			
		Full affiliation	Cross over	Full non-affiliation	Mean value	Standard deviation	Maximum value	Minimum value
Outcome variable	Number of “little giant” enterprises cultivated	562.5	269	70.5	409.23	441.90	1528	4
	Digital financial services	420.17	408.9	395.04	407.88	17.48	449.36	374.64
	Digital infrastructure	0.285	0.163	0.086	0.212	0.163	0.673	0.017
Condition variable	Digital innovation ability	31.955	26.75	23.64	30.48	11.08	65.49	18.07
	Digital government services	65	58.7	47.35	57.41	10.46	76.7	39.6
	legal environment	52.33	39.04	34.66	42.79	11.33	67.38	21.96
	Cultural environment	76.46	66.06	51.07	62.45	18.70	85.99	4.19

5. Study results and analysis

5.1 Necessity analysis

Before analyzing the conditional configurations, the necessity of each condition was tested individually. In the context of the digital economy, the analysis and test results of various elements of the business environment for the cultivation of SRDI enterprises are presented in Table 3.

Table 3. Analysis of Necessary Conditions

Condition variable	High cultivation level of SRDI enterprises		Low cultivation level of SRDI enterprises	
	Consistency	Coverage	Consistency	Coverage
digital financial service	0.875977	0.890001	0.243452	0.256087
~digital financial service	0.267809	0.254794	0.895428	0.882004
digital infrastructure	0.894885	0.870871	0.270214	0.272251
~digital infrastructure	0.252183	0.250244	0.871837	0.895694
digital innovation capability	0.917274	0.902461	0.256135	0.2609
~digital innovation capability	0.248769	0.244152	0.804243	0.818809
digital government services	0.784124	0.742631	0.355064	0.348153
~digital government services	0.311733	0.318273	0.737523	0.779595
legal environment	0.697328	0.679483	0.438202	0.44207
~legal environment	0.427418	0.423580	0.682288	0.700046
cultural environment	0.726282	0.700082	0.396284	0.395481
~cultural environment	0.372858	0.373643	0.699474	0.725706

As presented in Table 3, all antecedent conditions except for high digital innovation capacity fall below the 0.9 consistency threshold for necessity. This initially suggested that high digital innovation capacity might be a necessary condition for a high level of SRDI enterprise cultivation. However, an X-Y scatter plot of this condition against the outcome reveals that nearly one-third of the cases deviate from the diagonal. In accordance with Schneider and Wagemann (2012), this indicates that, despite its high consistency, high digital innovation capacity is not a necessary condition. This finding underscores the complexity of SRDI enterprise cultivation, demonstrating that outcomes are not driven by a single factor but require the synergistic interaction of multiple business environment elements.

5.2 Conditional configuration analysis

Configuration analysis moves beyond the necessity of single conditions to assess the sufficiency of causal condition combinations. Following established methodological standards (Du et al., 2020), this study applies a consistency threshold of 0.8, a frequency threshold of 1, and a PRI consistency score of 0.7. Given the underexplored relationship between these business environment elements and SRDI enterprise cultivation within the digital economy, the analysis assumes causal openness meaning that both the presence and absence of any of the six conditions could potentially contribute to the outcome. The fsQCA 3.0 software produces complex, parsimonious, and intermediate solutions. In line with conventional practice (Du et al., 2020; Fiss, 2011), the findings primarily report the intermediate solution, complemented by the parsimonious solution, as presented in Table 4.

5.2.1 High Cultivation Configurations

The analysis identifies three distinct configurations that lead to robust SRDI enterprise growth: the Digital Comprehensive Leading, Digital Innovation-Legal Coordination, and Digital Core-Driven models. These pathways highlight the pivotal roles of digital inclusive finance, innovation capability, and government services as core drivers of success. The following section elaborates on these models.

(1) Digital Comprehensive Leading

This configuration demonstrates strong explanatory power for high-level SRDI enterprise cultivation, with near-perfect consistency (0.999) and substantial raw coverage (0.678). The Digital Comprehensive Leading model highlights the critical role of an integrated digital ecosystem, where digital inclusive finance, infrastructure, innovation capability, and government services develop synergistically. Here, inclusive finance provides vital funding, infrastructure supplies the technical foundation, innovation drives technological progress, and digital government services optimize the institutional environment. Their interaction generates powerful synergies that facilitate high-level cultivation even in the absence of strong traditional legal or cultural frameworks. This demonstrates how comprehensive digital development can effectively compensate for deficiencies in traditional business environment factors.

Exemplary cases include Beijing, Zhejiang, Jiangsu, Shandong, Guangdong, and Shanghai. These regions have established robust digital ecosystems that achieve coordinated development across all four digital dimensions. Notably, their success in cultivating SRDI enterprises despite weaker traditional environments clearly illustrates the compensatory power of digital advancement. Consequently, this configuration yields a critical policy implication: comprehensive digital transformation is indispensable for fostering SRDI enterprises in the digital economy era.

Table 4. Configuration analysis of the cultivation level of SRDI enterprises

	High cultivation level configuration			Low cultivation level configuration			
	Configuration 1	Configuration 2	Configuration 3	Configuration 4	Configuration 5	Configuration 6	Configuration 7
Digital financial services	●	●	●	⊗	⊗	⊗	⊗
Digital infrastructure	●		●	⊗		⊗	⊗
Digital innovation ability	●	●	●	⊗	⊗	⊗	⊗
Digital government services	●	●		⊗	⊗		
Legal environment		●	⊗		⊗	⊗	●
Cultural environment			⊗		⊗	⊗	●
Consistency	0.999	0.989	0.923	0.986	0.925	0.981	0.994
raw coverage	0.678	0.630	0.181	0.634	0.398	0.428	0.195
Unique coverage	0.066	0.057	0.056	0.169	0.007	0.034	0.067
Solution consistency	0.972			0.958			
Solution coverage	0.792			0.745			

Note. ● indicates the existence of the core condition and ⊗ indicates that the core condition does not exist; ● indicates that the auxiliary condition exists and ⊗ the auxiliary condition does not exist; the blank indicates that the presence of the variable has no impact on the result.

(2) Digital Innovation-Legal Coordination

This configuration demonstrates strong explanatory power for high-level SRDI enterprise cultivation, with a consistency of 0.989 and raw coverage of 0.630. The Digital Innovation-Legal Coordination model highlights a synergistic pathway where digital inclusive finance, innovation capacity, government services, and a robust legal environment collectively drive development. Notably, this configuration achieves high-level outcomes even without dominant digital infrastructure, demonstrating that the integration of other core digital elements with a sound legal framework can compensate for this limitation.

Exemplary cases include developing regions such as Anhui, Sichuan, Jiangxi, and Chongqing. These provinces achieve high-quality SRDI cultivation by coupling innovation-driven strategies with strong legal institutions. While they may lack the advanced digital infrastructure of first-tier hubs, they effectively leverage digital financial services, efficient e-government, and reliable legal frameworks to create an innovative-conducive environment. This pathway underscores the critical importance of synergizing digital economic elements with legal development, offering a viable strategy for high-level SRDI cultivation in resource-constrained contexts.

(3) Digital Core-Driven Models

This configuration demonstrates unique explanatory power for cultivating high-level SRDI enterprises, with a consistency of 0.923 and a raw coverage of 0.180. The Digital Core-Driven model highlights a pathway centered on foundational digital economy drivers, integrating digital financial inclusion, robust digital infrastructure, and strong innovation capabilities. Notably, the absence of digital government services, a prominent legal framework, and a supportive cultural environment in this configuration indicates that high-level SRDI cultivation can be achieved primarily through these core digital elements.

Hunan and Henan provinces emerge as representative cases. While these regions lag behind coastal counterparts in traditional business environment metrics, they have established successful, technology-centric development models by strategically prioritizing digital financial services, infrastructure, and enterprise innovation. This experience suggests that, especially in regions with weaker traditional support systems, strengthening intrinsic digital core capabilities can be more consequential than improving the external institutional environment, thereby offering valuable insights for industrial policy formulation in developing inland regions.

5.2.2 Low Cultivation Configurations

In contrast, low SRDI growth is associated with configurations marked by deficiencies in digital infrastructure, innovation capabilities, and financial services. The typical pathways are as follows:

(1) Lack-of-Digital-Innovation Type

This configuration demonstrates significant explanatory power for low-level SRDI enterprise cultivation, with a consistency of 0.925 and raw coverage of 0.398. The "Lack-of-Digital-Innovation" type reveals a critical deficit in both digital financial inclusion and innovation capacity, compounded by the subpar performance of other business environment elements. This creates a compounding negative effect that severely impedes SRDI enterprise development. Representative cases, including Liaoning, Inner Mongolia, and Guangxi, epitomize this pattern, where the dual deficiency in financial support and innovation capacity forms a self-reinforcing negative feedback loop. This finding underscores the foundational role of digital finance and innovation in cultivating SRDI enterprises and highlights the urgent need to construct an integrated financial and technological innovation ecosystem.

(2) Weak Digital Foundation Type

This configuration demonstrates strong explanatory power for low-level SRDI enterprise growth, with a consistency of 0.981 and raw coverage of 0.428. The “Weak Digital Foundation” type is characterized by critical deficiencies in digital financial inclusion, infrastructure, and innovation capacity, despite the presence of a relatively sound legal environment. This combination creates a “digital core deficit,” wherein even a robust legal framework is insufficient to compensate for fundamental weaknesses in the digital ecosystem and support high-level SRDI cultivation. Representative cases such as Gansu and Heilongjiang exemplify this pattern; these regions are grappling with broadly underdeveloped digital economies. While they have established reasonably effective traditional legal institutions, their regulatory frameworks have failed to evolve in tandem with the demands of the digital era. The persistence of this configuration underscores the indispensable role of core digital infrastructure and capabilities, while simultaneously highlighting the urgent need to modernize legal environments to effectively support digital economic development.

(3) Traditional Advantages-Digital Backwardness

This configuration demonstrates strong explanatory power for low-level SRDI enterprise cultivation, with a near-perfect consistency of 0.994 and a raw coverage of 0.195. Designated the “Traditional Advantages-Digital Backwardness” type, it is defined by stable legal and cultural environments coupled with a significant lag across all key digital economy elements—financial inclusion, infrastructure, innovation capacity, and government services. This disparity creates a critical imbalance; even robust traditional institutions cannot compensate for a deficient digital ecosystem, thereby hindering high-level SRDI cultivation. Regions such as Hainan and Yunnan exemplify this contradiction. Despite their strong foundational institutions, these provinces struggle with digital transformation, as their established legal and cultural advantages have failed to catalyze digital economic development. This may foster an over-reliance on traditional strengths while obscuring the imperative for digital modernization. This configuration underscores the indispensable role of the digital economy in driving regional innovation and reveals the significant challenge of integrating entrenched traditional advantages with new technological paradigms (Greckhamer et al., 2018).

5.3 Robustness test

In this paper, a robust test was conducted on configurations leading to high SRDI enterprise cultivation. First, raising the consistency threshold from 0.8 to 0.85 did not alter the resulting configurations, with overall consistency and coverage remaining unchanged. Second, lowering the PRI consistency threshold from 0.7 to 0.65 also did not significantly affect configuration consistency or coverage. These results confirm the robustness of this study's findings.

6. Conclusions and Policy suggestions

6.1 Conclusions

This study employed fsQCA to investigate how different configurations of business environment factors shape the growth of SRDI SMEs in China's digital economy. The analysis identified seven distinct configurations, indicating that SRDI enterprise development results from the interactive dynamics between digital and traditional environmental elements. The main conclusions are as follows: (1) No Single Necessary Condition: None of the factors—digital infrastructure, innovation capacity, government services, legal framework, or cultural environment—individually constitutes a necessary condition for enterprise growth. (2) Primacy of Digital Drivers: High-growth configurations consistently feature robust digital components, especially digital finance, innovation capability, and e-government services. Conversely, their absence corresponds to low-growth outcomes, even where traditional advantages exist. (3) Configurable Synergy Rather Than Causality: Digital economy factors function configurationally rather than causally, meaning that their joint presence explains high SRDI cultivation within the sample, not universal causal sufficiency. The absence of any single digital core component substantially reduces the configuration's overall effectiveness. (4) Contextual Role of Traditional Factors: Traditional institutional and cultural factors remain significant but achieve their full effect only when embedded within a strong digital foundation. These findings

enrich the understanding of how combinations of digital and traditional environment factors interact to promote SRDI enterprise growth.

6.2 Theoretical contributions

This study makes three primary theoretical contributions. First, it adopts a configurational perspective to innovatively reveal the causal mechanisms linking the business environment to SRDI enterprise cultivation. By identifying multiple equifinal pathways, it transcends the limitations of traditional linear analysis and challenges the assumption of universal policy applicability. Second, the fsQCA findings robustly support configurational theory, confirming the existence of multiple distinct pathways to successful SRDI enterprise development and thereby underscoring the principle of equifinality. This methodological approach proves more effective than conventional correlational methods in uncovering the complex, asymmetric relationships among factors, thereby advancing theories of regional innovation ecosystems. Third, the study constructs an integrated "digital-traditional" analytical framework, elucidating the pivotal role of digital transformation in cultivating SRDI enterprises. It reveals how digital elements can assume a compensatory role for deficiencies in the traditional environment, offering a new paradigm for understanding firm-level innovation and development in the digital era.

6.3 Policy suggestion

Building upon the empirical configurations identified in this study, policy guidance for SRDI enterprise cultivation should move beyond generalized recommendations toward a differentiated and outcome-oriented framework that reflects the distinct developmental patterns of provinces across China. The fsQCA results reveal clear heterogeneity in business environment configurations: some regions achieve high-level SRDI growth through comprehensive digital ecosystems, others through innovation-legal coordination, while several lag behind due to structural deficiencies in digital or institutional foundations. Accordingly, policy priorities should be classified by provincial type, with explicit and measurable objectives established for each category.

For digitally advanced regions such as Beijing, Zhejiang, Jiangsu, and Guangdong, policy efforts should focus on consolidating existing advantages by deepening the integration of digital finance, innovation ecosystems, and data infrastructure. The goal is to achieve sustained innovation-driven upgrading and serve as demonstration zones for digital-institutional synergy.

For transitional regions such as Anhui, Sichuan, Jiangxi, and Chongqing, where innovation and legal frameworks already play a strong complementary role, policies should prioritize strengthening digital infrastructure, improving e-government efficiency, and enhancing the linkage between financial inclusion and technological innovation. These regions should establish phased progress indicators to ensure balanced advancement between digital capacity building and institutional development.

For less-developed regions, including Gansu, Yunnan, Tibet, and Xinjiang, where the configurations reveal systemic digital deficiencies, the primary focus should be on expanding digital connectivity, fostering inclusive financial systems, and promoting entrepreneurship ecosystems for SRDI-oriented firms. The success of these initiatives can be evaluated through measurable improvements in digital access, financing participation, and enterprise formation rates.

Collectively, these differentiated and measurable strategies provide a systematic roadmap for optimizing China's business environment, promoting regional balance, and advancing the high-quality development of SRDI enterprises in the digital economy era.

6.4 Research Limitations and Prospects

This study contains the following limitations: First, constrained by data availability, the analysis relies solely on provincial-level cross-sectional data, which limits the ability to fully capture the dynamic impact mechanisms through which business environments influence SRDI enterprise

cultivation. Second, the research focuses primarily on macro-level institutional environment factors, without accounting for micro-level enterprise characteristics and behavioral dynamics.

Future research directions may include: (1) Develop panel datasets to deeply explore the dynamic evolutionary relationships between business environments and SRDI enterprise cultivation. (2) Integrate enterprise micro-data to investigate how different enterprise types respond heterogeneously to business environment factors. (3) Introduce cross-national comparisons to analyze variations in SRDI cultivation models under different institutional contexts. (4) Conduct in-depth research on the interaction mechanisms between digital economy and traditional environmental factors, to inform more targeted business environment optimization policies.

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