Original Research

Factors Affecting Manufacturing Enterprises' Sustainable Development Performance – Based on the fsQCA Method

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Abstract

In the face of huge pressure of resources and the environment, sustainable development is a certain way to effectively improve resource utilization and enhance the competitiveness of enterprises themselves. Based on a synergistic evolutionary perspective, this study selected 289 Chinese manufacturing enterprises as samples, tried to analyze the configuration effects of environmental regulation, green dynamic capability, slack resources and sustainable dual innovations with fsQCA method, so as to reveal the multiple concurrency mechanisms affecting the sustainable development performance of manufacturing enterprises. The study concludes that: no single factor is a prerequisite for sustainable development performance; the paths to high levels of sustainable development performance can be divided into two development models, namely incentive-capability-innovation-oriented and resource-innovation-oriented; there are various ways to improve sustainable development performance in different given situations. The findings of the study enriched the factors that affect how well manufacturing enterprises perform in terms of sustainable development, and explore internal and external synergistic mechanisms for doing so from a histological perspective, advancing the study of manufacturing enterprises' sustainable development under the severe resource environments.

Keywords: sustainable development performance, environmental regulation, green dynamic capability, slack resources, sustainable dual innovations

Introduction

With the backdrop of the global epidemic of COVID-19, climate change has become one of the most serious non-traditional security issues facing the world today and will pose a serious threat to human production and development [1]. With successive economic recovery programs that prioritize green growth, more and more countries are starting to adopt the principle of sustainable development into their national economy. By September 2021, 121 countries had committed to being carbon-neutral by the middle of the 21st century, and 114 had promised to update their Intended Nationally Determined Contributions (INDCs) for 2030. Carbon neutrality is becoming an irreversible global trend [2]. Currently, as one of the representatives of emerging economies, China is experiencing a rapid

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expansion and high growth, and the manufacturing industry, forming the foundation of its real economy, has significantly boosted the country's growth. However, such fast expansion also resulted in resource depletion and environmental degradation [3]. An essential issue that has to be resolved is how to accelerate the high-quality growth of the manufacturing sector and achieve the transformation from a manufacturing country to a manufacturing power. Officially, the government set up the target of "carbon peak 2030, carbon neutral 2060" in 2020, which guides manufacturing enterprises to follow the path of sustainable development with low-carbon economy and green transformation. Since China's manufacturing industry is the major contributor to its industrial growth, investigating its sustainable development path is a necessary condition to improve China's industrial development [4], as well as of practical significance to other countries in such an economic transition.

To develop sustainably, enterprises need to take its impacts on economy, society, and environment into consideration [5]. The existing literature mostly discussed the sustainability of manufacturing enterprises by observing how well they performed from either an internal or external perspective of the organization. From the perspective of internal enterprise governance, some scholars have examined the intrinsic motivation of organizational capability, organization structure, digital transformation, business model innovation etc. to enhance enterprise performance. Huang et al. [6] identified that dynamic capability, coordination, and social reciprocity are important drivers of green innovation, and green innovation positively affects organizational performance and environmental performance. Ritu et al. [7] examined the moderating effect of organization structures on the link between relational capability and dynamic capability, which are significant to firm performance, and found that decentralization would facilitate information exchange and processing, thereby enhancing dynamic capability. Guo & Xu [8] found that the intensity of digital transformation is positively correlated with process-based operating performance and negatively correlated with profit-oriented financial performance, which can result in value creation and business growth. Latif [9] focused on small and medium-sized enterprises and proved that their business model innovation can optimize the process of value creation, transmission, and acquisition of enterprises, thus affecting enterprise performance. From the external perspective, existing research placed emphasis on corporate social responsibility and governance management. By integrating ecological environment into technological innovation activities, some enterprises boosted corporate performance by improving resource utilization efficiency and lowering environmental pollution [10]. At the government level, environmental regulation policies are used to solve environment problems and to enhance green innovation. However, it is unclear whether

environmental regulation policies are effective in directing enterprises to implement green innovation and develop sustainably [11]. The "Promotion" hypothesis asserts that environmental regulation encourages enterprises to adopt green innovation practices, the "Inhibition" hypothesis insists that environmental regulation hinders green technology innovation, and "U-shaped" hypothesis highlights that as time goes on and environmental regulation intensifies, the impact of environmental regulation on green innovation will shift from inhibiting to promoting. At the social level, stakeholder pressure, alliance network, and social responsibility have dramatic impacts on corporate performance and sustainability. Jones et al. [12] maintained that developing stakeholder relationships properly may give businesses competitive advantages and boost performance. Zhang et al. [13] proposed that positive market response could be attained from emphasizing fulfilling social responsibility. Castiglioni [14] confirmed that the network size of enterprise alliance influenced enterprise performance positively through network resource analysis. Ko et al. [15] took Chinese listed firms as research subjects and discovered that an enterprise's ability to innovate is correlated with its sense of social responsibility and social position.

Although the research on the sustainable development performance of manufacturing enterprises is rich, most studies mainly adopted a single perspective to examine one or two factors. Few studies have integrated internal and external perspectives to explore the connections between factors across hierarchies and potential synergies on the economy, society, or environment [16]. In general, sustainable development performance focuses on a company's ability to simultaneously consider and balance economic, environmental, and social issues when providing products or services to maximize value [17]. Due to the fast changing business environment, a "more encompassing, co-evolutionary perspective" could open up new ideas for scholars, by "integrating micro- and macro-level evolution within a unified framework, incorporating multi-level analysis and contingent effects, and leading to new insights, new theories, new empirical methods, and new understanding" [18]. Therefore, this paper uses the theory of co-evolution to explore whether the complementarity of multiple internal and external factors do have synergistic effects on sustainable development performance. Using 289 Chinese manufacturing enterprises as research objects, we applied fsQCA method to examine the configuration of high-level sustainable development performance. To be specific, we tried to solve the following three problems: (1) How to select the influencing factors of sustainable development performance of enterprises? (2) What are key factors of configurations of the high-level sustainable development performance? (3) Whether multiple factors at different levels support or exclude one another in the process of achieving sustainable development performance?

Our research contributes to the literature in the following ways. Firstly, the co-evolution theory is introduced into the study of sustainable development performance of manufacturing enterprises, and the interaction and influence between enterprises and environment are studied [19]. Owing to the positive feedback mechanism and path dependence of factors across hierarchies, the sustainable development of enterprises is always in an open and expanding environment. This result contributes to a better understanding of the co-evolution theory and enriches the research content of the sustainable development of enterprises. Secondly, a bridge has been established between the macro-institutional-level and the micro-organizational-level, which facilitates the joint exploration of the evolution track and direction of the interaction between government system and organizational behavior [20]. By incorporating environmental regulation, green dynamic capability, redundant resources and sustainable dual innovations into one research framework, our research also examines the possible bidirectional effects among these factors. Meanwhile, our research unveils the co-evolution of corporate sustainability by multiple subsystems [21], uncovers broader government-business interactions in an institutionalized context, and provides insights into issues that have not been fully exposed in business and society research. Finally, we adopted fsQCA method with configuration thinking instead of traditional empirical test with net effect and binary relation. Such a method will be conductive to transfer the perspectives of unidimensional to holistic in related research [22]. The implementation of the sustainable development performance are further identified by examining the configuration effect of different factors, and solutions and recommendations are offered.

The paper is structured as follows. Section 2 reviews the relevant literature. Section 3 introduces research method, data source, and the measurement of variables. Section 4 presents and analyses the results. Section 5 concludes the paper.

Literature Review

Coevolution Theory

As a biological term, "co-evolution" was first put forward by Ehrlich and Raven in 1964. Specifically, it refers to the fact that species are constantly influenced by one another and coevolve to some extent, and that particular traits of one species tend to attract or repel those of another [23]. With the diffusion by numerous scholars, it has quickly branched out into non-biological domains like economics, organization and management, geology, astronomy, psychoanalysis, etc., and has progressively developed into a scientific study methodology to examine complicated phenomena [24]. Current studies mainly use the perspective to explain the bidirectional interaction and dynamic evolution [25]. Lewin and Volberda (1999) confirmed that the co-evolution of an organization has clear hierarchies, such process is encouraged and impacted by various factors, and it eventually forms a more stable and sequential state. The state has five characters: multidirectional causalities, multi-levelness, nonlinearity, positive feedback, and path and history dependence.

A composite system of the sustainable development of manufacturing firms can be established depending on its internal subsystem and external environment. The driving forces and orientations of its dynamic evolution depend on how many components interact and relate to one other. In China, environment regulation is a government-advocated policy and a major force of its green economy [26]. Institutional pressure also has a convergence impact among organizations, which makes organizational behavior congruent with the demands of the institutional environment [27]. Thus, environment regulation is a significant external driver of enterprise sustainability. Meanwhile, noticing that organization's own dynamism and heterogeneity may influence the institutional environment [28], this research also includes elements such as green dynamic capability, slack resources, and sustainable dual innovations. Those elements had been proven to be beneficial to organizational development, into the analysis to identify the role played by multiple elements across hierarchies in advancing corporate sustainability.

Environmental Regulation and Sustainable Development Performance

For regions with increasingly rigorous environmental restrictions to gain competitive advantages and spur economic development, green innovation has a crucial role to play in attaining the win-win goals of environmental conservation and technical advancement [29]. Based on the practice of environmental regulation policies in China, formal environmental regulation may be split into two categories, command-control environmental regulation and market-incentive environmental regulation. Command-control environmental regulation refers to the progress through which government agencies that oversee regulated businesses demand that they adhere to a set of rules and standards to protect the environment. Due to its strict requirements and high certainty, it offers the advantages of high efficiency and dependability in changing corporate habits and resolving issues with environmental contamination [30]. While market-incentive environmental regulation relies on market mechanisms, such as tax subsidies and market-based transactions, allowing businesses to individually determine their pollutant emissions accordingly. Profit-maximizing businesses can make more flexible decisions to increase production efficiency and lower production costs, which will ultimately help to offset or slow down the cost pressure brought

on by government environmental regulation and achieve the goal of lowering pollutant emissions and protecting the environment [31]. In China's environmental governance and ecological construction, these two categories of environmental rules are being gradually enhanced. To realize green and sustainable development, environmental regulation policies can promote green total factor productivity by increasing market concentration and creating obstacles to entry for the green market [32]. The government strictly limits the growth of industry with significant pollution emissions and uses administrative decrees to force the closure of some outdated businesses. Taxes, tariffs, and high compliance costs also drive some unproductive enterprises out of the market, increasing the pressure on market leaders to innovate.

The Porter hypothesis states that environmental regulation encourages corporates to innovate to grow sustainably. Accordingly, properly designed environmental regulation can encourage company innovation and lower costs by increasing energy efficiency and decreasing waste creation [33]. In the short run, the environmental tax's incentive for corporate emission reduction is insufficient, and environmental pollution cannot be effectively regulated because it reduces productivity. As a result, corporates' output decreases as their costs for pollution management and emission reduction rise. In other words, the environmental regulation policy raises the excess production costs of corporates, which will impact their productivity and profit margins, lower their performance, and hurt their competitiveness [34]. In the long run, the innovation compensation of environmental regulation policy will take over. As time passes, the higher cost may be offset by technological advancement, inventive production modes, or even new performance, resulting in a further intensification of the positive impact and a reduction in the negative impact [35]. Meanwhile, research to date indicates that various environmental regulations affect an organization's decision to choose a proactive or reactive environmental strategy in the context of extended producer responsibility regimes, resulting in varying economic and environmental performance [36].

Green Dynamic Capability and Sustainable Development Performance

The term "dynamic capability" was initially used by Teece et al. [37], to describe an organization's capacity to combine, build, and reorganize internal and external resources to respond to a fast-changing environment. Green dynamic capability, the deepened and extended version of dynamic capability, indicates that an enterprise uses existing resources and knowledge, updates and develops its green development ability to cope with a dynamic market [38], emphasizing intra- and inter-enterprise green knowledge learning and creation, as well as the sensitivity to environmental changes. Studies have proved that enterprises, with sustainability-oriented dynamic capabilities, can attain corporate sustainability and long-lasting competitive advantages [39]. Due to the increased focus on environmental issues, it is crucial for businesses to establish green dynamic capability that assists sustainable development challenges, adjusts strategic orientations, introduces green innovative techniques, and enhances organizational competence.

To be specific, green dynamic capability includes resource integration capability, resource reconstruction capability, and environmental insight capability [40]. The stronger an enterprise's resource integration capability, the better its departmental coordination and cooperation, and the simpler it is to get scarce resources that support enterprise innovation and eventually translate into long-term benefits [41]. Meanwhile, the ability to reconstruct resources in business environment changes and firm expansion also contributes to sustainable competitive advantage [42]. Effective resource allocation boosts the flexibility of enterprises and maximizes the utility of resources. Businesses can react to the market more quickly and lessen the environmental effect of their products when they focus more on resource and environmental sustainability. The capacity to understand the environment demonstrates how sensitive businesses are to environmental changes, which forces them to recognize and grasp opportunities (or avoid risks) by reallocating organizational resources in accordance with strategy requirements. Research demonstrates that by gathering and using market environment data, businesses can better understand and grasp policies related to green development, changes in industry green technologies, industry development trends, and customers' green needs, influencing their environmental strategy decisions [43]. In general, businesses' major objective in enhancing their green dynamic potential is to strike a balance between their economic interests and environmental commitments, eventually achieving the strategic aim of sustainable development [44].

Slack Resources and Sustainable Development Performance

Slack resources are resources that can be used to accomplish organizational goals and are crucial endogenous elements in the expansion of a company [45]. Scholars did extensive research on the sorts of slack resources due to industry heterogeneity and different resource usages. Singh [46] divided slack resources into absorbed slack resources and unabsorbed slack resources by their flexibility. Following the law of decreasing availability, Bourgeois and Singh labeled slack resources as available slack resources, recoverable slack resources, and potential slack resources. And Sharfman et al. [47] classified high-liquidity slack resources and low-liquidity slack resources in terms of the level of the liquidity and exclusivity of assets. Due to the nature our research question, this study

adopted the standard of Singh et al., in which absorbed slack resources include resources that the organization use as costs, such as sales expenses, management costs, operating costs, etc.; while unabsorbed slack resources include liquidity resources that have not been allocated but will be used in the organization, such as cash and marketable securities. Resource conditions are fundamental building blocks for successful strategic decision-making, and as the complexity of the environment rises, enterprises must consider all relevant factors, including the efficient use, incentives, and profitability of owning various sorts of resources [48]. More specifically, when the external environment changes, unabsorbed slack resources with high conversion capacity can be utilized to make internal adjustments. Absorbed slack resources, which are characterized by precipitation, typically have roots in particular fields and take on specialized functions.

Organization theory and agency theory are often applied to analyze the relationship between slack resources and enterprise performance. Organization theory asserts that an organization's primary goal is to survive, and slack resources could foster innovation, ease internal tensions, lessen environment changes and maintain stability. Therefore, positive correlations are proved in slack resources and enterprise performance [49]. Agency theory holds that a firm is a complex composed of contracts between principals and agents. The existence of slack resources exacerbates the agency problem, since excessive slack resources facilitate the expansion of managers' rights and over-investment, which are contrary to the principle of efficiency and are not conducive to the growth of corporate performance [50]. In addition to the dispute of the results of linear relationship research, there are also a lot of studies concerning nonlinear relationship between slack resources and performance. Based on the behavioral-system view, some scholars believed that the management of slack resources mainly depends on the characteristics of these resources and the institutional environment of enterprise operations, so it is not advisable to develop "lean" enterprises continuously [51]. When temporal symmetry and impact persistence are considered, the result revealed that the inverted U-shaped link between slack resources and performance is related to resource types and the business cycle, where timely resource utilization adjustment is required [52]. When organizational structure is integrated into the relationship between slack resources and performance and extended to corporate social responsibility, the results showed that the synergistic effect of different slack resources in enterprises has a significant impact on social responsibility performance.

Sustainable Dual Innovations and Sustainable Development Performance

With the intensification of competition and the acceleration of change, enterprises need to enhance their own strength by deploying current capabilities and exploring new ones. March [53] elaborated the paradox of exploration and utilization, which sparked a discussion on dual innovation. Exploratory innovation refers to creative endeavors that include significant risks and the use of fresh information and resources by businesses to achieve breakthroughs. Exploitative innovation describes the gradual and less risky invention processes used by businesses to make use of their current resources and expertise. These two diverse innovation ways play distinct roles and are beneficial to the growth of enterprises innovation [54]. In the research of sustainable development, Matjaž et al. [55] conceptualized the multidimensional natures of sustainable practice and split it into sustainable exploratory practice and sustainable exploitative practice. Khan et al. [56] further put forward sustainable exploratory innovation and sustainable exploitative innovation from the perspective of sustainable security and the sustainable improvement, where sustainable exploratory innovation refers to create new sustainable products or technologies, and sustainable exploitative innovation means to improve the existing products or expand professional knowledge.

Sustainable innovation has good impacts on the sustainable performance of enterprises and is conducive to competitive advantages. Duality is the capability to pursue high-level exploration and exploitation concurrently, and prior work supports the positive correlations between exploration-exploitation strategies and organizational performance. Shi et al. [57] suggested that exploration and exploitation are positively correlated with each other, and both can improve organization performance, especially in R&D contexts or more competitive environments. It can be concluded that sustainable exploration reflects process innovation (such as technological solutions at the end of pipelines), product innovation (such as improvements or new products/service) and sustainability-oriented learning (such as innovation ability and competitiveness associated with sustainable development) [58]. Exploratory innovation places a strong emphasis on deviating from the established technological and commercial path, while these radical and revolutionary traits may not have an immediate positive impact on financial performance, they do help to create differentiation and form sustainable competitive advantages [59]. Exploitative innovation concentrates on what businesses already know and has little uncertainty and high success rates. It contributes to accomplishing organizational objectives and market positions by strengthening service quality, expanding product range and distribution channels, cutting costs while increasing operational efficiency, and upgrading current product design [60]. As the impact of environmental dynamics and competitiveness on dual innovation gradually attracts attention, scholars found that exploration and exploitation both affect enterprise performance, but the likelihood and nature of the performance outcomes

vary across activities and depend on the organizational and environmental contingencies. Exploratory innovation, which results in higher performance but with larger risks, is a preferable choice in more unstable environments. The preferable course of action is to continue utilizing the core strengths to develop growing streams of revenue while the environment is reasonably steady and there are no firm-level revenue declines. [61]. Moreover, Cao et al. [62] proposed the concept of balance and complementarity of dual innovations from the perspective of resource acquisition. They held that while gaining external resources, attention should be devoted to the complementarity of dual innovations, and when resources are few, greater emphasis should be placed on the balance of dual innovations. Li et al. [63] further integrated the dual innovation balance and complementation into the concept of collaborative dual innovation with the synergy theory. They established that cooperative dual innovation may significantly influence long-lasting competitive advantages. For businesses to maintain their innovation vitality, which is essential for the development of their sustainable competitive advantage, the collaborative use of exploratory and exploitative innovation enables the advantages and disadvantages of innovation activities to complement one another, which results in the effect of 1 plus 1 greater than 2.

Method and Data

Research Method: fsQCA

Qualitative Comparative Analysis (QCA) was proposed by Ragin, an American sociologist, in the 1980s [64]. It is a collective analysis method, which aims to solve the phenomenon of causal complexity. By applying set theory and Boolean operation, one or more different configurations of factors are obtained which can cause observable changes or discontinuities in the interpreted results [65]. QCA adopts configuration thinking with holistic perspective, which is more in line with inter-dependence and multiple conjunctural causation of management practice. The competition between enterprises are escalating competition and more and more factors need to be considered for the sustainable development of manufacturing enterprises, which requires managers adopting an complex management perspective to analyze the effects of various variables on business growth. However, empirical analysis with traditional statistical methods (such as multiple regression and structural equation model) may not be able to fully predict the reality in certain situations [66].

Therefore, this paper adopts fsQCA method for the following reasons: (1) Traditional empirical analysis, lacking of the holistic perspective, tends to imprint "general linear reality" assumptions and "net-effects thinking" on the resulting theories, while fsQCA can capture causal complexity, the configuration relationships between multiple attributes, and the causal relationships with the results [67]; (2) The problem in this study is about set relation, and asymmetry exists between the combination of conditions and results. Qualitative comparison method can identify the interdependence, configuration equivalence and causal asymmetry between conditions, effectively fixing the defects of conventional regression techniques [68]; (3) Since the majority of the variables involved in this study are continuous variables, fsQCA can accurately capture the subtle effects of changes in antecedent conditions at different levels.

Data Collection

To ensure a balanced regional distribution and the representativeness of economic development, this study covered many cluster regions such as Shandong, Jiangsu, Zhejiang, Anhui, Shanghai, Hebei, Tianjin and Beijing. A total of 414 questionnaires were sent out, and 289 valid questionnaires were finally collected with an effective recovery rate of 69.81%. The descriptive statistics of the valid sample are shown in Table 1.

Measures

The variable data were collected mainly through Likert 7-level scales (1 means "strongly disagree", 7 means "strongly agree"). To ensure the reliability and validity of the scales, all scales were designed with reference to the mature scales of foreign scholars, and translation and back-translation procedures were carried out to avoid the impact of semantic differences.

Sustainable Development Performance

In this paper, sustainable development performance (SUSP) was measured from three dimensions: business performance (BP), environmental performance (EP) and social performance (SP). Based on the scales of Maletič et al. (2016), four indicators were used to measure business performance, and the representative items included: "Return on investment (ROI) has increased above industry average during the last 3 years"; Four indicators were used to measure environmental performance, representing questions including: "The efficiency of the consumption of raw materials has improved during the last 3 years"; In addition, three indicators were used to measure social performance, representing items included: "The turnover ratio has decreased during the last 3 years".

Environmental Regulation

This study focused on measuring command-control environmental regulation (CCER) and market-

Table 1. Characteristic of samples.

Variable	Options	Quantity	Percent
Enterprise Nature	Private enterprise	113	39.1
	Collective enterprise	112	38.8
	State-owned enterprise	33	11.4
	Joint venture enterprise	14	4.8
	Foreign-invested enterprise	17	5.9
Enterprise Age (year)	Under 5	33	11.4
	6-10	39	13.5
	11-20	119	41.2
	21-30	54	18.7
	Above 31	44	15.2
Enterprise Scale (employees)	Under 50	34	11.8
	51-200	72	24.9
	201-500	72	24.9
	501-2000	74	25.6
	Above 2001	37	12.8
Asset Scale (ten-thousand-yuan)	Under 50	6	2.1
	51-200	17	5.9
	201-500	38	13.1
	501-2000	96	33.2
	Above 2001	132	45.7

incentive environmental regulation (MIER). The former mainly relies on administrative means to enforce enterprises to meet certain standards or requirements, and the latter changes enterprise pollution emission decision by market incentives such as lowering taxes and raising subsidies. Based on the scales of Sun et al. [69] and Luo et al. [70], five questions were set for command-control environmental regulation, the representative questions included: "The industry has relatively mature environmental laws and regulations"; four questions were set for market-motivated environmental regulation, and the representative questions included: "The Enterprise can receive government subsidies if they carry out environmental governance".

Green Dynamic Capability

The measurement of green dynamic capability (GDC) mainly referred to the scales of Chen and Chang (2013), which consisted of 7 items. The representative items included: "The company has the ability that can fast monitor the environment to identify new green opportunities".

Slack Resources

Slack resources can be divided into unabsorbed slack resources (USR) and absorbed slack resources (SR). This paper took two scales for reference, one from Tang & Peng (2003), and the other from Huang & Li [71]. Three items are respectively allocated to measure unabsorbed slack resources and absorbed slack resources, the representative items, accordingly, were: "Whether the firm's retained earnings have been sufficient for market expansion", "The development of the project is under the available capacity of your company".

Sustainable Dual Innovation

Sustainable dual innovation included sustainable exploratory innovation (SUSER) and sustainable exploitative innovation (SUSEI). The study mainly refers to the scales of Maletič et al. (2016). Eight items were adopted to measure sustainable exploratory innovation from two dimension: sustainable product and process development (SPPD) and sustainable organization learning (SOL). Among the four items of sustainable product and process development, the representative items included: "The organization makes improvements to radically reduce environmental impacts of products and services' life-cycles". Among the four items of sustainable organization learning, the representative item included: "The organization continuously strengthens employees' knowledge and skills to improve efficiency of current sustainability practices"; Sustainable exploitative innovation consisted of six items, and the representative item was: "We always respond to existing stakeholder issues in a regular/systematic way".

Analysis and Result

Data Test

This study employed the Harman single factor technique to rule out common method bias, which could result from data being acquired from the same source. The findings indicate that there is no issue with one factor accounting for the majority of variations because the first principal component CMV is 32.22%, which is less than 50% of the overall variance. The strongest correlation across all constructs, as shown in Table 2, is 0.74, which is lower than the predicted exceptionally high correlation (r>0.90), which would result in common technique bias. As a result, the research findings is not subject to such a bias. An overview of the means, standard deviations and correlations of the constructs is also provided in Table 2.

Smart-PLS was used to verify the reliability and validity of the measurement model. The relevant results are shown in Table 3. For convergent validity, all the

Table 2. Descriptive statistics and discriminant validity.

Variable	Av.	S.D.	Correlation matrix										
			1	2	3	4	5	6	7	8	9	10	11
1 BP	5.11	0.71	**0.80**										
2 EP	5.36	0.81	0.52**	**0.78**									
3 SP	5.31	0.99	0.48**	0.54**	**0.85**								
4 CCER	5.71	0.77	0.31**	0.57**	0.40**	**0.77**							
5 MIER	5.55	0.78	0.30**	0.53**	0.34**	0.67**	**0.76**						
6 GDC	5.38	0.92	0.44**	0.56**	0.59**	0.60**	0.47**	**0.81**					
7 USR	5.35	0.93	0.48**	0.43**	0.36**	0.41**	0.38**	0.45**	**0.84**				
8 SR	4.92	1.25	0.39**	0.46**	0.44**	0.47**	0.47**	0.48**	0.51**	**0.90**			
9 SSPD	5.64	0.65	0.38**	0.43**	0.38**	0.52**	0.45**	0.51**	0.40**	0.36**	**0.77**		
10 SOL	5.62	0.67	0.43**	0.48**	0.37**	0.54**	0.44**	0.52**	0.41**	0.37**	0.74**	**0.76**	
11 SUSEI	5.44	0.66	0.47**	0.51**	0.38**	0.42**	0.43**	0.50**	0.44**	0.40**	0.53**	0.53**	**0.73**

Note(s): (1) Significance levels: $p<0.10$*; $p<0.05$**; $p<0.01$***; (2) Diagonal values in bold represent the square root of the AVE.

Table 3. The results of reliability and validity.

Construct	Item	Factor loading	t-statistic	Cronbach's Alpha	C.R.	AVE
Business Performance (BP)	*BP1*	0.82	40.97	0.81	0.88	0.64
	BP2	0.73	24.55			
	BP3	0.82	37.54			
	BP4	0.82	35.17			
Environment Performance (EP)	*EP1*	0.77	23.32	0.78	0.86	0.60
	EP2	0.78	30.79			
	EP3	0.77	25.59			
	EP4	0.78	28.03			
Social Performance (SP)	*SP1*	0.81	30.55	0.81	0.89	0.72
	SP2	0.89	60.56			
	SP3	0.85	48.26			
Command-control environmental regulation (*CCER*)	*CCER1*	0.80	29.37	0.82	0.88	0.59
	CCER2	0.75	21.40			
	CCER3	0.75	19.40			
	CCER4	0.75	25.04			
	CCER5	0.78	23.68			
Market-incentive environmental regulation (*MIER*)	*MIER1*	0.76	18.59	0.75	0.84	0.58
	MIER2	0.77	22.09			
	MIER3	0.75	23.45			
	MIER4	0.75	18.99			

Table 3. Continued.

Green dynamic capability (GDC)	GDC1	0.78	29.50	0.91	0.93	0.66
	GDC2	0.81	31.39			
	GDC3	0.80	32.65			
	GDC4	0.83	32.67			
	GDC5	0.83	39.64			
	GDC6	0.83	37.70			
	GDC7	0.80	31.59			
Unabsorbed slack resource (USR)	USR1	0.87	40.79	0.79	0.88	0.70
	USR2	0.82	38.10			
	USR3	0.82	33.31			
Absorbed slack resource (SR)	SR1	0.84	30.59	0.88	0.93	0.80
	SR2	0.92	95.16			
	SR3	0.92	111.12			
Sustainable product and process development (SPPD)	SPPD1	0.78	25.31	0.78	0.86	0.60
	SPPD2	0.77	27.19			
	SPPD3	0.76	24.26			
	SPPD4	0.79	29.59			
Sustainability-oriented learning (SOL)	SOL1	0.77	24.89	0.75	0.84	0.57
	SOL2	0.77	28.30			
	SOL3	0.74	24.42			
	SOL4	0.74	19.54			
Sustainable exploitative innovation (SUSEI)	SUSEI1	0.71	18.90	0.82	0.87	0.53
	SUSEI2	0.72	18.88			
	SUSEI3	0.71	19.64			
	SUSEI4	0.74	22.87			
	SUSEI5	0.71	21.12			
	SUSEI6	0.80	30.54			

Note(s): (1) CR: Composite reliability; (2) AVE: Average variance extracted; (3) All item loadings are significant at p<0.01.

indicator loadings of each construct were above the recommended threshold of 0.5, all the constructs' CR (composite reliability) values exceed the suggested cut-off of 0.8, and overall AVE (average variance extracted) values were above 0.5, indicating that the convergent validity of overall constructs was good. For discriminant validity, as Table 2 showed, the square root of AVE (diagonal elements) for each construct was larger than its correlations with other constructs (off diagonal elements), which proved that there was a certain discriminative validity among constructs. Furthermore, the Cronbach's α coefficient of all constructs were above 0.7. Thus, overall measurement items had adequate item reliability.

In addition, this study measured sustainable development performance as a single construct made up of three dimensions: BP, EP and SP. As presented in Table 4, the three dimensions reflect the higher-order construct. Similarly, sustainable exploratory innovation was operationalized as a second-order consisting of two dimensions: SPPD and SOL, as shown in Table 5.

Data Calibration

After obtaining all original data, the calibration method is used to convert the data into a fuzzy set within the range of 0-1, the core of which is to define three qualitative threshold values: full membership value, turning point, and non-membership [72]. This study used fsQCA3.0 software to calibrate data with ratios of 90%, 50% and 10%, which are generally adopted in qualitative comparative analysis [73].

Table 4. Second-order construct of Sustainable Development Performance.

First-order construct	First-order			Second-order	
	Indicator	Loading	t-value	Loading	t-value
BP	*BP1*	0.82	40.97	0.83	28.38
	BP2	0.73	24.55		
	BP3	0.82	37.54		
	BP4	0.82	35.17		
EP	*EP1*	0.77	23.32	0.85	33.05
	EP2	0.78	30.79		
	EP3	0.77	25.59		
	EP4	0.78	28.03		
SP	*SP1*	0.82	40.97	0.80	29.91
	SP2	0.73	24.55		
	SP3	0.82	37.54		

Note(s): All item loadings are significant at $p < 0.01$.

Table 5. Second-order construct of Sustainable Exploratory Innovation.

First-order construct	First-order			Second-order	
	Indicator	Loading	t-value	Loading	t-value
SPPD	*SPPD1*	0.78	25.31	0.94	89.42
	SPPD2	0.77	27.19		
	SPPD3	0.76	24.26		
	SPPD4	0.79	29.59		
SOL	*SOL1*	0.77	24.89	0.93	81.71
	SOL2	0.77	28.30		
	SOL3	0.74	24.42		
	SOL4	0.74	19.54		

Note(s): All item loadings are significant at $p < 0.01$

Table 6. The threshold settings of variables.

Variable name	Non-membership value	Turning point	Full membership value
Sustainable development performance (SUSP)	4.364	5.273	6.000
Command-control environmental regulation (CCER)	4.800	5.800	6.600
Market-incentive environmental regulation (MIER)	4.700	5.500	6.500
Green dynamic capability (GDC)	4.571	5.571	6.286
Unabsorbed slack resources (USR)	4.333	5.333	6.333
Absorbed slack resource (SR)	3.000	5.333	6.00
Sustainable exploratory innovation (SUSER)	4.975	5.625	6.167
Sustainable exploitative innovation (SUSEI)	4.364	5.273	6.00

Table 7. The necessity analysis of each single factor.

Variable	High-level SUSP	
	Consistency	Coverage
CCER	0.747003	0.777044
~CCER	0.478016	0.512686
MIER	0.740842	0.744257
~MIER	0.467728	0.520680
GDC	0.779963	0.822485
~GDC	0.452133	0.478237
USR	0.778914	0.756459
~USR	0.449905	0.520704
SR	0.772165	0.768639
~SR	0.456720	0.513671
SUSER	0.737763	0.757315
~SUSER	0.498723	0.542365
SUSEI	0.703297	0.767246
~SUSEI	0.505668	0.517537

Note(s): „~" refers to logical non.

The threshold settings for each variable are shown in Table 6.

Empirical Test with FsQCA

After calibration of variables, necessity analysis was conducted through two indicators (consistency and coverage) of all antecedent factors. Consistency is used to determine whether antecedent factors are sufficient or necessary conditions for outcome variables. If consistency index is higher than 0.90 [74], Factor X is considered to be a necessary condition for Result Y. Coverage index describes the explanatory power of antecedent factors to the outcome, the higher the coverage index, the stronger the explanatory power. As seen in Table 7, the highest consistency index of all antecedent factors was 0.78, less than 0.90, which showed that these factors had a certain stimulating effect on the high-level sustainable development performance, but they were not necessary conditions to drive it. Therefore, it is essential to configurate these factors to make further examination on sufficiency conditions analysis.

Configuration analysis was conducted by the truth table to evaluate the causal sufficiency. Combined the viewpoints of Ragin and other scholars, this study set the default case threshold to 1, the consistency threshold to 0.85, and the PRI. threshold 0.86. The results are shown in Table 8, where four configurations could achieve high-level sustainable development performance. The consistency of each single configuration is higher than 0.80, as well as the consistency of the overall solution, which is 0.93, and the coverage of overall solution is 0.53. These numbers show that each configuration can fully explain the results, as well as being sufficient conditions to achieve high-level sustainable development performance.

After classifying the same core conditions of antecedent factors, two development modes are obtained to achieve high-level sustainable development performance: Incentive-capability-innovation-oriented mode (Configuration Ha) and Resource-innovation-oriented mode (Configuration Hb).

Table 8. The fsQCA of High-level Sustainable Development Performance.

Conditions	Ha		Hb	
	Ha1	Ha2	Hb1	Hb2
CCER	•	•	▫	•
MIER	●	●		•
GDC	●	●	•	
USR		•	•	•
SR	●		●	●
SUSER		●	●	●
SUSEI	●	●	●	●
Consistency	0.93983	0.945211	0.953923	0.941682
Raw coverage	0.444204	0.408099	0.237402	0.394666
Unique coverage	0.0650023	0.0288972	0.037481	0.0154641
Overall consistency	0.929166			
Overall coverage	0.526047			

Note(s): (1) ● represents the existence of core conditions, □ represents the absence of core conditions; • represents the existence of auxiliary conditions, ▫ represents the absence of auxiliary conditions; (2) In view of the lack of definite evidence that antecedent conditions affect the direction of the outcome variable, the default criterion is chosen in counterfactual analysis, that is, the present or absent of a single factor is assumed to be the cause of high-level sustainable development performance.

Incentive-Capability-Innovation-Oriented Configurations

In the configuration Ha, market-incentive environmental regulation, green dynamic capability and sustainable exploitative innovation are core conditions, and command-control environmental regulation plays an auxiliary role. Different from previous research, command-control environmental regulation has no obvious effects on promoting sustainable development performance. Possible explanations for this include the fact that China's industrial environment has improved significantly over the past several years, thanks to economic expansion fueled by command-control environmental regulation. However, environmental standards are merely minimum red lines for the overall industry, although it is hard to activate more energy, a certain range of pollution emission could still be maintained constantly. In contrast, dominated by market-incentive environmental regulation, enterprises are more flexible, find it easier to make their own suitable strategic decisions on sustainable growth and achieve high-level innovation performance. To withstand the dual pressures of volatile environment and fierce competition, enterprises should be equipped with strong green dynamic capability to actively collect, identify and predict external information such as green technological changes, green demands and various policies related to enterprise green development. At the same time, the stability of sustainable exploitative innovation promotes enterprises to fully utilize their own advantages, coordinate resource allocation and react fast to environmental changes, therefore improving sustainable competitive advantages.

Further analysis shows that the consistency of configuration Ha1 is 0.940, and the unique coverage is 0.065, where absorbed slack resources is the core condition. In configuration Ha2, the consistency is 0.945, and the unique coverage is 0.029, where sustainable exploratory innovation is the core condition but unabsorbed slack resources the auxiliary condition. An comparison reveals that absorbed slack resources, embedded into business activities, are more beneficial to driving sustainable exploitative innovation and improving innovation performance. Additionally, more adaptable unabsorbed slack resources are needed to give assurance if businesses place a high priority on sustainable exploratory innovation. Therefore, the first configuration to achieve high-level sustainable development performance is as follows:

Type 1: Under the dominance of market-incentive environmental regulation, enterprises can achieve high-level sustainable development performance with green dynamic capability and sustainable exploitative innovation (Ha1 and Ha2).

Resource-Innovation-Oriented Configurations

In configuration Hb, absorbed slack resources and sustainable dual innovations are core conditions while unabsorbed slack resources play an auxiliary role, which mean that sustainable dual innovations are significant driving forces to obtain high-level sustainable development performance, and absorbed slack resources are important resources base. On the one hand, both two innovative ways of sustainable dual innovations are crucial to sustainable development. Sustainable exploratory innovation, with strategic initiative, could develop forward-looking products and technologies by exploring industry information, which is conducive to form differentiated advantages. Sustainable exploitative innovation could boost resource utilization and generate cost advantage through upgrading existing products and technologies. On the other hand, absorbed slack resources, with its stability, lower the danger of over-investment in the process of innovative activities to preserve long-term business performance. In addition, unabsorbed slack resources, with its flexibility, increase the flexible innovation arrangements and give a support to sustainable development.

Further analysis showed that the consistency in configuration Hb1 is 0.953, and the unique coverage is 0.037, where the lack of command-control environmental regulation and the existence of green dynamic capability are auxiliary conditions. In configuration Hb2, the consistency is 0.942, the unique coverage is 0.395, and environmental regulations play auxiliary roles. A comparison shows that command-control environmental regulation and market-incentive environmental regulation are of little significance if enterprises adopt sustainable dual innovations to promote sustainable development performance, where these innovation activities adhere to the principles of eco-friendliness, low carbon emissions, and sustainability to a large extent. Meanwhile, enterprises implementing sustainable dual innovations will inevitably have better ability to integrate, rebuild, and allocate resources. Even in the absence of green dynamic capability, enterprises might continually optimize resources and achieve sustainable development. Therefore, the second configuration to achieve high-level sustainable development performance is as follows:

Type 2: Regardless of the existence of environmental regulation, enterprises can achieve high-level sustainable development performance through sustainable dual innovations and absorbed slack resource (Hb1 and Hb2).

Robustness Test

In this study, two methods are selected to further test the robustness of the results. Method 1 is to change

Table 9. Robustness Test (Adjust the case threshold).

Conditions	High-level SUSP	
	N	
	N1	N2
CCER	•	•
MIER	●	●
GDC	●	●
USR	•	•
SR	•	
SUSEI		•
SUSER	●	●
Consistency	0.942429	0.945211
Raw coverage	0.408689	0.408099
Unique coverage	0.0294872	0.0288974
Overall consistency	0.939505	
Overall coverage	0.437586	

Note(s): The meanings of the symbols in the table are the same as those in Table 6.

case threshold. After improving the default set of case threshold from 1 to 2, 77% cases are contained, which conform to the requirements of the study. The results in Table 9 showed that the new two configurations of N had nuances with the original configurations of Ha, but no significant difference. Method 2 is to change the consistency threshold. After increase the consistency threshold from 0.85 to 0.9, the new results were the same as the original results. Therefore, the research results were relatively robust.

Discussion and Conclusion

Discussion

In this study, configuration effects of factors from institution-organization environment are applied to Chinese manufacturing enterprises sustainable development performance.

First, two environment regulations were found to positively affect the sustainable development performance of enterprises. This result supports Porter's hypothesis that institutional pressures facilitate rather than inhibit corporate green innovation and sustainable development [75]. Meanwhile, this study also found that market-incentive environmental regulation has more influence on sustainable development than command-control environmental regulation. This conclusion is at odds with the opinion of Meng et.al. (2020), who supported mandatory environmental regulation can stimulate corporate environmental proactivity. However,

this conclusion was consistent with Sun et al. (2021), who regarded market signals as motivations to more actions on regulating corporates production behavior. These could be caused by the different environmental regulation tools adopted by China on energy efficiency in different periods and regions.

Second, institutional pressure is not the only choice to drive the sustainable development of enterprises. The initiative and heterogeneity of organizations also play significant roles. In an organization, dual innovations are key to maintain long-term competitive advantages. This conclusion is in line with other scholars (Cao et al., 2006; Huang et al., 2017; Latif et al., 2021; Li et al., 2021), who explored the positive relationship between dual innovations and enterprises performance and competitive advantages, as well as the influencing mechanisms with mediation factors like conceptualization of ambidexterity, available resources, absorptive capacity, work context uncertainty, and influences from the organizational structure [76]. Focusing on slack resources, this study concluded that absorbed slack resources were important to exploratory innovation and exploitative innovation to promote sustainable development. However, Tabesh et. al. (2019) argued that more unabsorbed slack resources led to more exploration and less exploitation [77]. With less or the same institutional pressures, enterprises used absorbed slack resources to form resource potential barriers in a short-term, supporting both exploratory and exploitative practices effectively, which will stabilize internal system and promote sustainable development.

Conclusion

This paper collected questionnaire data from 289 Chinese manufacturing enterprises and adopted fsQCA method to analyze the configuration effects of seven internal and external factors, including environmental regulation, green dynamic capability, slack resources and sustainable dual innovations, on sustainable development performance of manufacturing enterprises, as well as their interactions. The results showed that: (1) The realization of high-level sustainable development has the characteristics of "multiple concurrency" and "same goal". Any single factor is not enough for enterprises to improve their sustainable development performance. The net effect of any factor on sustainable development performance is only valid under certain circumstances [75]. In fact, sustainable development performance is the equivalent result of the joint action of multiple factors. (2) There are two ways to achieve high level sustainable development performance: incentive-ability-innovation-oriented and resource-innovation-oriented. Enterprises can choose the most suitable development path in different situations. (3) When under great pressure of external policy environment, enterprises dominated by market-incentive environmental regulation are more flexible and capable of timely coordinating internal and

external resources and information with their strong green dynamic capabilities, as well as continuously carrying out sustainable exploitative innovation with high stability, in order to achieve high-level sustainable development performance (Ha). (4) When the external policy environment is unclear, enterprises with strong sense of innovation impulsively transfer and allocate absorbed slack resources quickly, which stimulate more sustainable exploratory innovation and sustainable exploitive innovation behaviors, thus effectively promotes high-level sustainable development performance (Hb).

Practical Implications

The complexity of the factors influencing the sustainable development performance of manufacturing enterprises suggests that the symbiotic co-existence of government institutions and organizational governance can compensate for the lack of sustainability of enterprises due to the unfavorable industry environment, and that sustainable development requires the synergy of multiple internal and external factors and joint drives.

At the macro-institutional level, governments at all levels should strive to develop regional economies, strengthen and improve institutions, and coordinate the interaction between heterogeneous environment regulations and organizations. When environmental access thresholds are ineffective, governments can leverage market mechanisms to stimulate enterprises' environmental governance efforts, and encourage their engagement in green technology research, development and application projects. In regions with better economic development, environmental access thresholds can be raised moderately, and efforts can be made to create and improve the regulatory and policy framework for promoting green and low-carbon development, as well as to strengthen long-term management mechanisms for energy conservation and emission reduction.

At the corporate governance level, enterprises should exemplify their own advantages, make the right strategic decisions based on the trajectories and expansion rates of different factors, and enhance their governance systems with a long-term orientation. When the institutional environment is incentive-oriented, enterprises should not blindly seek to break resource constraints and pioneer innovative approaches, but rather focus on core elements that can actively contribute to high levels of sustainable development performance, maximizing their green dynamic capabilities and the potential value of sustainably exploitative innovation. When the institutional environment is convergent, enterprises should use their initiative to create their own unique competitive edges and capture market positions as responds to intense competition. Innovation decisions need to be made with a dynamic balance between conservative exploitative innovation and radical exploratory innovation, and the acquisition and effective use of relevant resources need

to be strengthened, which can optimize the internal structure of enterprises and the process of sustainable development.

Limitations and Directions for Future Research

This research has several limitations. First, the data collected were from developed areas. However, the economic development is China is highly unbalanced and the result of our research might not be applied to underdeveloped areas. Future research can collect data from those less developed areas to make the results more accurate and targeted. Second, we only have cross-sectional data which cannot capture the causal relationship between variables. Future study can gather longitudinal data and panel data to examine conclusions obtained in this study. Finally, this study tried to analyze only seven typical factors that affect the performance of sustainable development from internal and external environments, which are far from enough. Future research can include additional factors, such as social networks, digital level, spatial agglomeration, that are closely related to the digital economy era, which will carry out a more systematic and practical study and excavate multiple configurations on sustainable development performance in-depth.

Conflict of Interest

The authors declare no conflict of interest.

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