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The Configuration Effect of Tea Enterprises′ Sustainable Production Technologies in China: Based on the FsQCA Method

Wpływ konfiguracji technologii zrównoważonej produkcji przedsiębiorstw herbacianych w Chinach: w oparciu o metodę FsQCA

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Abstract
Using the survey data of 45 tea enterprises in Fujian Province, China, this paper adopted fuzzy set qualitative comparative analysis (fsQCA) to study the adoption of the sustainable production technologies by tea enterprises. The results show that there are two configurations for the path to achieve the adoption of high sustainable production technologies. The core condition combination of the first configuration is the existence of sustainable development capabilities, the degree of government support, and the resource and environmental endowment, while that of the second configuration is the existence of enterprise expected value, industrial organization mode and the resource and environmental endowment. Moreover, the path achieving non-highly sustainable production technologies adoption mainly summarized as a configuration. Specifically, the core condition is the absence of sustainable development capabilities, enterprise development strategies, and the resource and environmental endowments. Furthermore, some practical policy recommendations were put forward based on the above conclusions in this paper.

Key words: agricultural enterprise, sustainable production technologies, fsQCA, China

Słowa kluczowe: przedsiębiorstwo rolne, technologie zrównoważonej produkcji, fsQCA, Chiny

Introduction

Agriculture is very closely linked to the UN Sustainable Development Goals (Grześkowiak et al., 2022). Organic agriculture plays an important role in the realization of the UN Sustainable Development Goals (Šeremešić et al., 2021). As one of the most important tea producing countries in the world, China plays an important role in the global tea trade. Tea economy is an important part of China's agricultural economy, and its sustainable development affects the overall process of agricultural sustainable development. It is generally believed that the implementers of sustainable development behavior mainly include the government, the public and enterprises. Among them, the enterprise is the most basic and key factor in the implementation of sustainable development behavior (Ai and Wang, 2018). In the process of business management, environmental and non-environmental decisions may affect the sustainable development of the industry, and the growth mode, efficiency and technological innovation of the enterprise constitute the basis of the sustainable development of the industrial economy. For instance, enterprises adopting voluntary environmental protection strategy can not only effectively solve the problems of environmental pollution and ecological damage caused by the rapid development of industry, but also an important path to promote the sustainable development of industry (Huybers and Bennett, 2003). Therefore, the development strategy of enterprises should pursue the mutual unity of internal economy and external economy (Wu et al., 2017).

Under the market economy, green enterprises with high resource utilization and good development prospects can effectively ensure the high quality and sustainable development of the industry. On the contrary, enterprises will eventually be revealed in their true colors under the effect of price discovery mechanism. For instance, in the field of agriculture, some tea enterprises manufacture and sell fake and inferior products, or forge the origin of products to obtain the credit weighting of national geographical indications, and ultimately obtain more profits. However, although the above practices can make enterprises obtain more economic benefits in the short term, in the long run, they will cause great damage to the industrial credit, damage the national geographical indication product protection system, seriously damage the market order, and cause unfair competition in the product market. Therefore, the enterprise's expected value and internal resource capacity will affect the enterprise behavior, and then affect the sustainable development of the industry. However, there is still a lack of sufficient research on which factors will affect the implementation path of sustainable production technology of tea enterprises, leading to many defects in policy-making.

1. Literature review

Currently, many scholars have done some research on the adoption of sustainable production technology. Specifically, when enterprises make decisions on sustainable production technology, they tend to pay attention to the current high cost burden and ignore the long-term advantages of sustainable production technology. When an enterprise's sustainability decisions are out of process, strategy, and long-term vision, its business activities may have a negative impact on the environment and society (Calabrese et al., 2019). However, the research shows that the two sales modes of *sustainable development* and *pollution for growth* coexist in China's industrial enterprises, but the industrial enterprises adopting the *sustainable development* sales mode can achieve faster sales growth than the *pollution for growth* mode through clean and environmentally friendly production technology (Zhang et al., 2020). In addition, the green transformation of traditional enterprises may lead to the decline of short-term profits, thus hindering the sustainable development of the industry. Therefore, we should focus on the relative value and long-term benefits of the green development of traditional enterprises. Furthermore, the external environmental factors such as the pressure of external stakeholders will also affect the choice of enterprises, and then affect the sustainable development of the industry. Therefore, it is necessary to continuously develop cooperative economic organizations, implement industry autonomy, and actively guide the upstream and downstream industries to establish a close connection mechanism, and take the road of industrial management.

Actually, many policies and measures to promote the sustainable development of agriculture need the support and cooperation of relevant industries and enterprises, so as to achieve effective industrial integration. For instance, industrial cluster, industrial ecology and industrial symbiosis are important factors for enterprises to promote the sustainable development of the industry, which need the integration and cooperation among enterprises in the whole industry chain. On the contrary, low industrial concentration, unreasonable product structure and low level of application and development will hinder the sustainable development of the industry. Therefore, the enterprises in the industrial cluster are the community of interests of symbiotic development. The competition and cooperation between enterprises and the resulting cluster effect are the source of the realization of industrial clusters' competitive advantages and sustainable development (Tracey et al., 1999). One possible explanation is that the competition and cooperation behavior of enterprises can jointly stimulate consumption demand and develop the market, and even jointly resist the threat of competition (Scott and Storper, 2003). It can also realize the spillover of the overall benefits of the cluster by sharing cluster resources and complementing advantages. The cooperation, cluster development, support initiatives, competitive rivalry, and differentiation behaviors of enterprises are interconnected and have an impact on sustainable development (Felzensztein et al., 2019). Therefore, in order to realize the sustainable development of industry, we must improve the level of specialization, intensification and ecology, especially realize the linkage optimization of enterprise resource status and industrial environment. Additionally, it can also effectively realize the sustainable development of the industry through such modes as the start-up of production base, the promotion of processing enterprises, the promotion of circulation enterprises and the interaction of cooperative organizations. Building an industrial symbiosis system with ecosystem characteristics is a new way to realize the sustainable development of the industry, and industrial symbiosis requires enterprises to cooperate with each other and use the waste produced by each other, so as to realize the optimization of resources (Huang et al., 2019). The government's sustainable financial subsidies, tax incentives and restrictive administrative policies will also affect the decision-making model of enterprises, change the production behavior and structure of enterprises, and thus promote the sustainable development of the industry (Zhou et al., 2015; Liao, 2018; Yang et al., 2018; Zhu et al., 2020). In addition, other scholars have successively analyzed theoretical discussions and practical models of industrial sustainable development from the enterprise level (Veiga and Magrini, 2009; Boscoianu et al., 2018).

However, the existing studies mainly focus on the impact of corporate behavior on the sustainable development of enterprises or regional economy, and ignore the importance of corporate behavior on the sustainable development of industry, which leads to more consideration of the short-term economic interests of enterprises in the study, but little mention of the long-term sustainable development of industry. In addition, due to the great differences in the sustainable development path of different industries, the existing studies ignore the industrial heterogeneity, mainly take industry and the tertiary industry as examples, and lack of in-depth research on agriculture, which leads to the policy recommendations may not be applicable to the sustainable development of agriculture. Therefore, this study takes tea enterprises in Fujian as an example, and applies fuzzy set qualitative comparative analysis to explore the implementation path of sustainable production technology of tea enterprises, in order to provide reference and policy suggestions for improving agricultural sustainable production technology and promoting agricultural sustainable development.

2. Materials and methodologies

2.1. Methodologies

Traditional quantitative research methods focus on the statistical significance of the impact factors on the result variables, and measure the marginal net effect of the single influencing factors on the result variables, mainly manifested in the unidirectional linear relationship and causal symmetry of the influencing factors (Liu et al., 2017). However, due to the various macro and micro environments faced by enterprise management become more and more complex, the influencing factors of enterprise management decision-making are also more and more complex. The results no longer rely solely on the linear effect of a single explanatory variable, but depend on the interdependence and joint effect of conditional variables. Therefore, the limitations of traditional quantitative research methods on related topics are gradually emerging. Based on this, as an effective integration of qualitative and quantitative research methods, especially from a holistic perspective, qualitative comparative analysis (QCA) has gradually been widely used in the field of strategy, organization and management research (Kraus et al., 2017; Greckhamer et al., 2018; Thomann and Maggetti,2020). For instance, Papatheodorou and Pappas (2017) used the QCA method to explore the complex relations among economic recession, job vulnerability, and tourism decision making. Also, the QCA method was applied to examine the achievement of customer engagement with social media (Gligor et al., 2019). The significant advantage of QCA method in considering the combination of multiple factors and conditions is consistent with the configuration effect analysis of multiple conditions on the sustainable production technology of tea enterprises. The fsQCA method can deal with the conditional variable and result variable of fixed distance and fixed ratio, that is, it can deal with the problem of variable degree change and partial membership, so it has more advantages. In view of the dual attributes of both qualitative and quantitative research, fsQCA method is used to analyze the configuration effect of the conditional variables used in the sustainable production technology of tea enterprises.

2.2. Data source

The peculiarities of the tea industry have resulted in the existence of more specialized farmer cooperatives, that is, mutual-aid economic organizations based on tea production operators or tea production and operation service providers and users. Therefore, the tea cooperatives that have been registered in accordance with the law by the administrative department for industry and commerce are included in the category of tea enterprises to conduct interviews and investigations. In addition, since the case selection criteria of fsQCA method not only require ensuring the full homogeneity of the case population, making the cases similar and comparable, but also ensuring the greatest difference in the case population (Qin and Yang, 2020), 45 tea enterprises and tea professional cooperative societies in Fujian (hereinafter referred to as tea enterprises) (Table 1) are finally selected as samples for research.

Table 1. The source distribution of the selected tea enterprises

Indicator	**Category**	**Frequency**	**Proportion (%)**	**Cumulative proportion (%)**
Type	Enterprise	36	80.0	80.0
	Professional cooperative	9	20.0	100.0
Scale	10 persons and below	10	22.2	22.2
	11–20 persons	12	26.7	48.9
	21–30 persons	4	8.9	57.8
	31–40 persons	0	0.0	57.8
	41–50 persons	2	4.4	62.2
	51 persons and above	17	37.8	100.0
History	3 years and below	3	6.7	6.7
	4–6 years	7	15.6	22.3
	7–9 years	9	20.0	42.3
	10–12 years	10	22.2	64.5
	13–15 years	3	6.7	71.1
	16 years and above	13	28.9	100.0
Part-time	Yes	25	55.6	55.6
	No	20	44.4	100.0

2.3. Variable selection

2.3.1. Result variable

The adoption of sustainable production technology (ASPT) is the result variable of the research on the sustainable development of tea enterprises. The composition of this index mainly includes the attitude, intention and behavior of tea enterprises towards the adoption of sustainable production technology. Generally, in order to effectively realize sustainable development of tea industry, as the main body of industrial development, enterprises must realize sustainable development. Moreover, the adoption of sustainable production technology is an essential key link and path for tea enterprises to successfully realize sustainable development. On the basis of consulting tea experts and considering the development of tea industry, sustainable tea production technologies mainly refer to five types, namely the optimization of tea tree species structure, the green prevention and control technology of tea plant diseases and insect pests, the construction and management technology of ecological and organic tea gardens, soil testing and formula fertilization technology in tea gardens, and tea garden interplanting and inter-cropping technologies.

2.3.2. Conditional variables

The adoption of sustainable production technology by enterprises is affected by the interweaving of many factors, and the fsQCA method can be used to effectively analyze the configuration effects of conditional variables. Therefore, based on the existing research, six conditional variables are finally selected to analyze the configuration of sustainable production technology adopted by tea enterprises, including sustainable development ability (SUDA), enterprise development strategy (ENDS), government support (GOSU), enterprise expected value (ENEV), industrial organization model (INOM) and resource and environmental endowment (REEE). The sustainable development ability reflects the harmonious unity of economic, social and environmental indicators of tea enterprises, indicating that the enterprises are on a good development path. In short, the sustainable development ability of enterprises is very important for enterprises. Realizing the sustainable development of enterprises is one of the keys to promote the sound and rapid development of China's economy, which determines the quality and sustainability of social and economic development. Specifically, tea enterprises with high sustainable development ability can make full use of healthy financial resources and rich material foundation, adopt sustainable production technology, and improve the scientific and technological competitiveness and brand awareness of tea products. Additionally, the enterprise development strategy can reflect the overall development direction and specific realization path of tea enterprises, which is closely related to the adoption of sustainable production technology. Generally, enterprises with relatively perfect and feasible development strategies tend to pay more attention to long-term interests, so they may increase their preference for the adoption of sustainable tea production technology.

The degree of government support reflects the guiding and encouraging role of the government in the sustainable technology adoption of tea enterprises. Specifically, the government can guide the production behavior of tea enterprises through agricultural financial subsidies to make them adopt more sustainable production technologies. The government can also give preferential tax and enterprise financing policies to tea enterprises that actively adopt sustainable production technology, so as to further guide the positive behavior of tea enterprises. In addition to financial subsidies and policy preferences, in order to effectively promote the sustainable development of the tea industry, the government will also take appropriate restrictive policy measures, such as restricting the use of pesticides and chemical fertilizers. In short, the government's incentive and restrictive measures will affect the adoption of sustainable production technology by tea enterprises. Furthermore, enterprise expected value is another important factor affecting the adoption of sustainable technology. In essence, an enterprise is an economic organization for profit. Its expectation of future economic benefits brought by operation and management decisions will obviously affect the current operation and management decisions. Therefore, when a tea enterprise is confident that the tea industry can achieve sustainable development, or that it can continue to obtain sufficient economic benefits from tea planting and production activities, or that the adoption of sustainable production technology will bring more economic benefits than the traditional production mode, the enterprise is more likely to adopt sustainable production technology.

Industrial organization model will also affect enterprises to adopt sustainable production technology. The industrial organization model is embodied in industrial agglomeration, industrial ecology and industrial symbiosis. If a region has a relatively complete tea industry chain, tea enterprises in the region can obtain more scale effects and technological progress at a lower cost and adopt sustainable production technology. If a region has good natural resource endowment and industrial development planning, for instance, the development of tea economy will not cause serious damage to the environment and ecology, enterprises in the region are more likely to adopt sustainable production technology. Industrial symbiosis reflects that there is competition and cooperation among tea enterprises at the same time. Enterprises with strong concept of industrial symbiosis are usually more willing to try to innovate tea production technology. In addition, resource and environmental endowments mainly reflect other resources and constraints inside and outside the enterprise, such as the degree to which the operation and management of the enterprise is affected by stakeholders and the correlation between the enterprise and other industries. For instance, with the continuous development of industrial integration, many tea enterprises have begun to step into the secondary industry and the tertiary industry, further develop and expand tea derivatives, and integrate them with tourism resources. Enterprises with high resource and environmental endowment usually have good inclusiveness and are more willing to introduce and blend production technologies. The above conditional variables are effectively measured by the average value of 7-level Likert scale. The logical framework of sustainable production technology adopted by tea enterprises is shown in Figure 1.

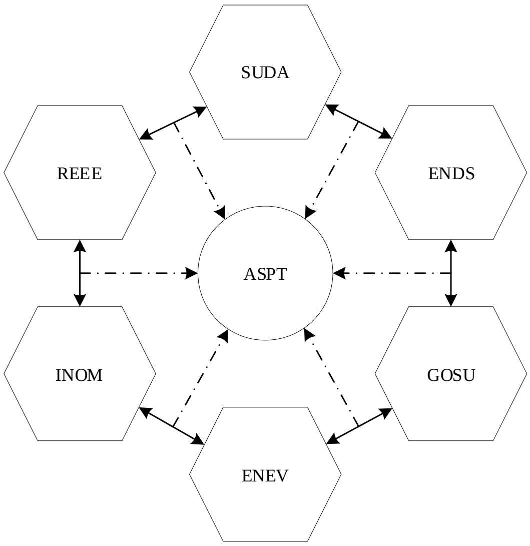

Figure 1. The logical framework of sustainable production technology adoption

3. Empirical results

3.1. Descriptive statistics

The Cronbach's alpha coefficient values of sustainable development ability, enterprise development strategy, government support, enterprise expected value, industrial organization model, resource and environmental endowment, and adoption of sustainable production technology are 0.928, 0.895, 0.877, 0.885, 0.843, 0.889 and 0.960, respectively, indicating that the measurement questionnaire has high internal consistency. In addition, the KMO values of the above measurement indicators all meet the basic standards. Specifically, the significance of the Bartlett sphericity test is 0.000, and each indicator can be reduced to a factor with a characteristic value greater than 1, indicating that the measurement questionnaire has a relatively high structural validity. Therefore, the conclusions of reliability test and validity test also prove that the questionnaire used by tea enterprises in sustainable production technology is scientific and reasonable. We take the average value of all measurement items contained in each variable as the assignment of the variable. Descriptive statistics and correlation analysis are shown in Table 2.

Table 2. Descriptive statistics and correlation coefficients of all variables

Indicator	**Mean**	**St. D**	**SUDA**	**ENDS**	**GOSU**	**ENEV**	**INOM**	**REEE**	**ASPT**
SUDA	5.44	1.317	1.000						
ENDS	5.64	1.261	0.841***	1.000					
GOSU	4.95	1.694	0.694***	0.601***	1.000				
ENEV	5.80	1.182	0.828***	0.749***	0.680***	1.000			
INOM	5.64	1.392	0.679***	0.768***	0.480***	0.741***	1.000		
REEE	5.63	1.313	0.817***	0.738***	0.704***	0.858***	0.758***	1.000	
ASPT	6.10	1.341	0.805***	0.837***	0.638***	0.819***	0.834***	0.836***	1.000

Note: *** indicates that the correlation coefficient is significant at the level of 1%.

3.2. Calibration of variables

Generally, fsQCA method calibrates the original assignment of condition variables and the result variable to the corresponding fuzzy subordination value between 0 and 1 by selecting the appropriate critical value of complete subordination, critical value of incomplete subordination and critical value of the junction point, so as to further study. However, there is no unified standard for variable calibration. At present, the mean and standard deviation can reflect the basic characteristics of the data, and the questionnaire data of Likert scale faces challenges in variable calibration (Botey et al., 2020). Combined with the actual situation shown by the research sample data, according to the theoretical and practical external knowledge or standards, we select the average value of the result variable and the conditional variables as the critical value of the intersection. Similarly, we select the mean minus one standard deviation as the critical value of incomplete subordination, and select the mean plus one standard deviation as the critical value of complete subordination. Ultimately, the anchor points of the result variable and conditional variables are shown in Table 3. After the variable calibration, we carry out the necessary conditional analysis to test whether the conditional variable and its negative conditional variable are a subset of the result variable and whether the result variable can be fully explained by a single conditional variable. Then, after the necessary condition tests of the conditional variables and their negative conditional variables, all possible logical combinations of the conditional variables corresponding to the result variables, namely the truth table, are obtained. When obtaining the truth table, according to the conventional research steps, combined with the approximate balance of the number of truth table rows with values of 0 and 1, we set the research sample frequency threshold to 1 and the consistency threshold to 0.95, and finally determine the number of cases entering the research.

Table 3. The calibration of conditional variables and the result variable

Type	**Name**	**Anchor point**		
		Complete subordination	Junction point	Incomplete subordination
Result variable	ASPT	7.445	6.104	4.763
Conditional variables	SUDA	6.761	5.444	4.127
	ENDS	6.898	5.637	4.376
	GOSU	6.642	4.948	3.254
	ENEV	6.982	5.800	4.618
	INOM	7.036	5.644	4.252
	REEE	6.943	5.630	4.317

3.3. Necessary condition analysis

Before the configuration analysis of conditional variables, we first test the necessity of the result variable caused by a single conditional variable, that is, to verify whether a single conditional variable belongs to the necessary condition constituting the result variable. Generally, consistency and coverage indicators are used as the judgment criteria. The former is mainly used to characterize the extent to which the result set constitutes a subset of the condition set, while the latter is mainly used to characterize the empirical correlation of the necessary conditions when the condition variables pass the consistency test (Li et al., 2021). If the conditional variable is proved to be a necessary condition for constituting the result variable, it is likely to be eliminated by the reduced solution in the truth table analysis. Therefore, this conditional variable should be excluded during configuration analysis. Generally, the rule of thumb holds that when the consistency index of the conditional variable is greater than 0.9, it can be considered that the conditional variable is a necessary condition to form the result variable (Li et al., 2021). The consistency and coverage index of the necessity test of conditional variables are shown in Table 4.

Table 4. Necessity test of conditional variables

Conditional variables	**ASPT**		**~ ASPT**	
	Consistency	Coverage	Consistency	Coverage
SUDA	0.809	0.870	0.450	0.332
~ SUDA	0.380	0.501	0.824	0.747
ENDS	0.804	0.862	0.476	0.350
~ ENDS	0.394	0.523	0.812	0.740
GOSU	0.737	0.815	0.484	0.368
~ GOSU	0.428	0.548	0.756	0.664
ENEV	0.833	0.866	0.516	0.368
~ ENEV	0.392	0.541	0.812	0.769
INOM	0.841	0.891	0.418	0.304
~ INOM	0.343	0.462	0.850	0.785
REEE	0.864	0.910	0.396	0.286
~ REEE	0.322	0.437	0.875	0.816

Note: ~ indicates not of logical operation.

As shown in Table 4, among all conditional variables constituting the adoption of sustainable production technology, the maximum value of consistency index is 0.864 of resource and environmental endowment. Similarly, among all the conditional variables constituting ~ sustainable production technology, the maximum value of consistency index is 0.875 of ~ resource and environmental endowment. The above two are less than 0.9, which means that all single conditional variables do not constitute the necessary conditions for the adoption of sustainable production technology and ~ sustainable production technology. Since the conditional variables did not pass the consistency test, it is not necessary to further demonstrate the coverage index. The above results further show that the explanatory ability of single conditional variable to result variable is weak, so it is necessary to study the configuration effect of conditional variable combination on result variable.

3.4. Combination condition analysis

Before the combination condition analysis, it is necessary to set the consistency threshold and frequency threshold and construct the truth table. Combined with the research needs, we set the consistency threshold to 0.935 and the research sample frequency threshold to 1, which meets the general standard of qualitative comparative analysis method. Through the standard analysis process of qualitative comparative analysis software, the specific combination relationship of condition variables, namely configuration effect, is analyzed.

The configuration effect of conditional variables adopted by tea enterprises for sustainable production technology is analyzed through the software fsQCA (Version 3.1). The configuration analysis results of high sustainable production technology and non-high sustainable production technology adopted by tea enterprises are shown in Table 5 and Table 6 respectively. Table 5 and Table 6 report the intermediate solutions of configuration analysis for high sustainable production technology adoption and non-high sustainable production technology adoption respectively. Combining intermediate solution and reduced solution, we can effectively identify the core conditions and edge conditions in the combination of specific conditional variables. Generally, the conditions existing in both intermediate solutions and reduced solutions are called core conditions, and the conditions existing only in intermediate solutions are called edge conditions (Guo and Zhang, 2021).

Table 5. Configuration analysis of high sustainable production technology adoption

Conditional variables	**Path 1**	**Path 2**	**Path 3**	**Path 4**
SUDA	●	●	●	⊗
ENDS			●	⊗
GOSU	●	⊗	●	●
ENEV	●	●		●
INOM	⊗	●	●	●
REEE	●	●	●	●
Consistency	0.955	0.978	0.947	0.975
Original coverage	0.199	0.251	0.543	0.161
Unique coverage	0.051	0.106	0.351	0.024
Consistency of solutions	0.955			
Coverage of solutions	0.728			

Note: ● indicates that the core condition exists; ● indicates that the edge condition exists; ⊗ indicates that the core condition does not exist; ⊗ indicates that the edge condition does not exists; blank indicates that the condition variable in the path can exist or not, and its existence or not has no impact on the result variable.

Table 6. Configuration analysis of non-high sustainable production technology adoption

Conditional variables	**Path 1**	**Path 2**
SUDA	⊗	⊗
ENDS	⊗	⊗
GOSU		⊗
ENEV	⊗	●
INOM	⊗	
REEE	⊗	⊗
Consistency	0.973	0.962
Original coverage	0.601	0.262
Unique coverage	0.415	0.076
Consistency of solutions	0.964	
Coverage of solutions	0.677	

Note: ● indicates that the core condition exists; ● indicates that the edge condition exists; ⊗ indicates that the core condition does not exist; ⊗ indicates that the edge condition does not exists; blank indicates that the condition variable in the path can exist or not, and its existence or not has no impact on the result variable.

3.4.1. Configuration analysis of high sustainable production technology

The configuration analysis of high sustainable production technology shows that there are four main paths to realize the adoption of high sustainable production technology by tea enterprises, as shown in Table 5. Specifically, it can be divided into two main configurations according to the similarities and differences of core conditions. The core conditional variable combination of the first configuration is the existence of sustainable development capacity, government support and resource and environmental endowment, including Path 1 and Path 3. The core conditional variable combination of the second configuration is the existence of enterprise expected value, industrial organization model and resource and environmental endowment, including Path 2 and Path 4. The overall consistency and coverage of the four paths using configuration analysis in high sustainable production technology are 0.955 and 0.728 respectively, which are higher than 0.8 and 0.7 respectively, indicating that the overall explanatory power of path configuration is strong and the results are reliable. The overall consistency and coverage of the four paths analyzed by the configuration analysis of enterprises adopting high sustainable production technology are

0.955 and 0.728 respectively, which are higher than 0.8 and 0.7 respectively, indicating that the overall explanatory power of path configuration is strong and the results are reliable. In addition, by comparing the original coverage of the four paths, the original coverage of Path 3 is higher than that of the other three paths, which explains 54.3% of the result variable. In contrast, the other three paths explain 19.9%, 25.1% and 16.1% of the result variables respectively, indicating that most tea enterprises realize the adoption of high sustainable production technology through Path 3.

In Path 1, tea enterprises with high sustainable development ability perform better than other enterprises in economic, social and environmental indicators, which comprehensively reflects the potential and ability of enterprises in promoting industrial sustainable development. The positive effect on the sustainable development of the industry makes the government more willing to increase the financial support, tax preference and policy preference for these tea enterprises, so as to help them establish a good competitive advantage in the field of tea. This advantage not only ensures that the operation and management decisions of tea enterprises are not easy to be affected by other stakeholders, but also can be closely related to other industries. This connection expands the vision of operation and management of tea enterprises, further urges tea enterprises to focus on long-term interests and sustainable development, strengthen the research and development of advanced production technology, and improve the expected results of tea sustainable development.

In Path 2, when tea enterprises have high expected value for industrial sustainable development and sustainable production technology, they may have a positive attitude and intention to adopt sustainable production technology in order to obtain more economic benefits. The existence of industrial organization model shows that the location of tea enterprises has a relatively complete tea industry chain, and there is a good competition and cooperation relationship between tea enterprises. Similarly, the existence of resource and environmental endowments indicates that the tea products and their derivatives produced by tea enterprises have high geographical indication recognition, and there is a close relationship between tea enterprises and other industries. When the above conditions are combined, tea enterprises may adopt high sustainable production technology. Additionally, tea enterprises with high sustainable development capacity have more sufficient resources and capacity to adopt sustainable production technology.

In Path 3, the sustainable development ability of tea enterprises comprehensively reflects the coordination and unity of economic, social and environmental indicators, indicating that enterprises pay more attention to social responsibility and resource and environmental awareness. This may greatly enhance the attitude, willingness and behavior of tea enterprises to adopt sustainable production technologies, such as reducing the use of pesticides and fertilizers. The government's financial support enables tea enterprises to have more financial resources, attract professional and technical talents, carry out the R&D and application of sustainable production technology, and give appropriate support to the financing needs of enterprises. In addition, some restrictive measures taken by the government for the tea industry, such as requiring a total ban on the production and sales of tea presses, urge tea enterprises to adopt sustainable production technology, especially for tea enterprises with relatively high sustainable production capacity. In addition, when the tea products in the area where the tea enterprises are located belong to geographical indication protection products, and there is a close relationship between the tea enterprises and other industries, the tea enterprises are more likely to adopt high sustainable production technology to improve the quality of tea products and their derivatives, so as to meet the needs of consumers for tea products and their derivatives in specific geographical areas. The perfection of enterprise development strategy shows that tea enterprises balance the relationship between short-term interests and long-term interests, and formulate the implementation path to achieve enterprise objectives. The perfection of industrial organization model shows that the tea industry chain is relatively complete, and there is mutual competition and cooperation among tea enterprises. Therefore, tea enterprises can obtain relatively low marginal production costs and are prone to scale effects.

Compared with other paths, path 4 requires all conditional variables to exert configuration effect in order to realize the adoption of high sustainable production technology. The existence of industrial organization model and resource and environmental endowment shows that tea enterprises have a good external environment for the adoption of high sustainable production technology. The expected value of enterprises reflects the comprehensive prediction of tea enterprises on the future development of the industry. Combined with the external environment that helps to drive the adoption of high sustainable production technology, tea enterprises are more likely to choose sustainable production technology. Government financial support and preferential tax policies further promote the adoption of sustainable production technology in the tea industry. Similarly, the government's restrictive policies for the industry further guide and strengthen the operation and management decision-making behavior of tea enterprises. Compared with other paths, this path emphasizes the driving role of external factors.

3.4.2. Configuration analysis of non-high sustainable production technology

The configuration analysis of non-high sustainable production technology shows that there are mainly two paths that can lead to the adoption of non-high sustainable production technology by tea enterprises, as shown in Path 1 and Path 2 in Table 6. These two paths have the same core conditions, that is, there is no sustainable development ability, enterprise development strategy and resource and environmental endowment. The overall consistency and coverage of the two paths in the configuration analysis of non-high sustainable production technology are 0.964 and 0.677 respectively, indicating that the overall explanatory power of path configuration is relatively strong and the results are relatively reliable. In addition, by comparing the original coverage of the two paths, the original coverage of Path 1 is higher than that of Path 2, which explains 60.1% of the result variable. Path 2 explains 26.2% of the result variable, indicating that most tea enterprises lead to the adoption of non-high sustainable production technology through Path 1.

In Path 1, the existence of government support has no substantial impact on the adoption of non-highly sustainable production technologies. When tea enterprises do not have high sustainable development capacity, it is easier to adopt non-high sustainable production technologies in pursuit of short-term economic benefits, such as extensive use of pesticides and chemical fertilizers to improve tea planting and production efficiency. The imperfection of enterprise development strategy also shows that tea enterprises tend to short-term interests, and there is no clear implementation plan for the realization of enterprise objectives. The lack of resource and environmental endowment shows that tea products and their derivatives do not have a better competitive advantage, and the operation and management decisions of tea enterprises are more vulnerable to the influence of stakeholders, such as existing competitors and potential competitors. One possible explanation is that the bad competitive environment and adverse external conditions make tea enterprises more inclined to pursue short-term economic benefits and produce the adoption of non-high sustainable production technology.

In Path 2, the existence of industrial organization model has no substantive impact on the adoption of non-high sustainable production technology. Like the conclusion shown in Path 1, tea enterprises are more likely to adopt non-high sustainable production technology in order to obtain sufficient economic benefits and maintain the normal operation and development of enterprises when they do not have relatively high sustainable development ability and relatively perfect enterprise development strategy, and have limited resource and environmental endowment. The essential attribute of profit makes enterprises pay more attention to short-term interests. Compared with Path 1, the lack of government support and the existence of enterprise expected value are equivalent to the lack of enterprise expected value and industrial organization model. Therefore, the action direction and degree of enterprise expected value should be studied more deeply in combination with the configuration effect of conditional variables.

4. Conclusions

In this paper, fsQCA method is used to analyze the configuration effect of conditional variables of high sustainable production technology adoption and non-high sustainable production technology adoption in tea enterprises. The main conclusions of the paper are as follows: (1) There are two main paths to produce highly sustainable production technology. The core conditional variable combination of the first configuration is the simultaneous existence of sustainable development capacity, government support and resource and environmental endowment. The core conditional variable combination of the second configuration is the existence of enterprise expected value, industrial organization model and resource and environmental endowment. Combined with the core conditions and edge conditions, there are four main ways for tea enterprises to adopt high sustainable production technology. (2) There is mainly a configuration of the path adopted to produce non -high sustainable production technology, and its core variables are the absence of sustainable development capability, enterprise development strategy and resource and environmental endowment. Combined with the core conditions and edge conditions, there are two main ways for tea enterprises to adopt non-high sustainable production technology.

Therefore, in order to improve the adoption of sustainable production technology by agricultural enterprises, some practical suggestions can be put forward from the perspective of enterprises, government and the linkage between enterprises and government, especially to strengthen the combination of influencing factors of sustainable production technology adoption. It should be noted that strengthening the adoption of sustainable production technologies by agricultural enterprises usually does not require the joint action of all conditional variables. Firstly, tea enterprises should make full use of internal and external resources, strengthen and enhance their sustainable development ability, ensure that enterprises can be in an invincible position and enhance their core competitiveness in the face of complex competitive environment. Secondly, the government should fully change its functions and strengthen its regulatory role in the effective allocation of resources by the market. For instance, the government should constantly improve the financial support, tax preferential policies and restrictive policies for industrial development, and strengthen the incentive and guidance for the adoption of sustainable production technology by enterprises. Thirdly, we should strengthen mutual coordination between enterprises and the government and jointly create a fertile soil conducive to agricultural development.

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