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Analysis on the production capacity improvement path of China's new energy vehicle enterprises based on QCA method

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Abstract. With the aggravation of the world energy crisis and environmental pollution, the development of the automobile industry has been greatly affected. As an emerging industry, new energy vehicles have grown rapidly and gained a firm foothold in the global market. As one of the representatives of the global emerging industries, the development of its new energy vehicle enterprises has attracted the attention and expectation of the international community. At present, the main problem restricting its development is the efficiency of its production improvement, and exploring the production capacity improvement path suitable for the enterprise's own mode has become a hot topic. Based on the QCA analysis method, this paper analyzes a number of new power enterprises in China, and draws a variety of production capacity improvement paths, providing systematic guidance for China's new energy vehicle enterprises, helping them to better cope with market competition and technological change, and is of great significance to promote the sustainable development of the new energy vehicle industry.

Keywords: new energy vehicles,production capacity increase, QCA analysis.

1. Introduction

In recent years, with the rapid development of the world economy, the contradiction between traditional energy and ecological environment has become increasingly intensified, and the new energy industry has developed rapidly. Under the strong promotion of China's relevant industrial policies, China's new energy vehicle industry is showing a rapid development trend. At present, the annual production and sales scale of vehicles and the assembly volume of power lithium battery both rank first in the world. At present, the overall development level of China's new energy vehicles has been significantly improved, and new energy vehicles have gradually entered a new stage of improving quality and expanding output. With the increasingly fierce competition in the supply chain of new energy vehicles, the self-developed automobile production mode of self-use has been difficult to adapt to the competition. If China's new energy vehicles develop according to the traditional automobile industry mode, it is likely to follow the old road of "self-research technology and key parts assembly and sales meager profit".

In such a realistic background, the new energy vehicle technology developers and the new energy vehicle manufacturers began to consider the cooperation between the two sides in the production of new energy vehicles, and the cooperative parties each provide complementary resources for joint resource allocation, so as to increase the output. In the context of sharing economy, the cooperation between new energy vehicle supply chain enterprises has become a trend. However, some new energy forces choose to directly acquire the production qualification of traditional automobile enterprises to build their own factories for vehicle production and build smart factories in their own manufacturing bases, realizing leap-forward development. There are also many traditional car companies in the market in order to achieve strategic transformation, the establishment of new energy brands, through independent design and development, using their own profound accumulation in the automotive field, quickly occupy the domestic market. Different new energy vehicle enterprises choose different vehicle production modes based on their own resource input decisions and supply and demand conditions. Self-construction and borrowing production can solve the production problems of the enterprise, but it will affect the future development strategy of the enterprise. Today, with the increasingly fierce market competition in the new energy vehicle industry, the production mode of production the new forces choose will be greatly related to its

resource investment and strategic decision. In view of the numerous factors affecting the selection of the production mode of automobile enterprises, the analysis of the factors affecting the selection of the capacity improvement path of new energy vehicle enterprises has theoretical value and practical significance for the future development of new energy vehicle enterprises.[1]

2. Literature review

2.1 Production mode of automobile manufacturing industry

With the continuous change of market environment, the competitive pressure of manufacturing industry is getting more and more big. How to carry out production, what form of production mode to choose and how to innovate is the key to maintain the core competitiveness of enterprises. For the selection and innovation of the production mode of manufacturing enterprises, Zhang Qingshan et al. (2007) constructed the integration plan and control method system and model of the cooperative production on the cooperative production management of the network alliance of manufacturing enterprises, providing strategic support for the cooperative production management practice of the manufacturing enterprise alliance.[2] Wu Yan (2015) With the help of the industrial integration path analysis of new energy vehicles and production services, she put forward that the production technology continuously penetrates and innovates between the manufacturer, the service provider and the technology developer, forming a complementary micro integration mode of technology development and product manufacturing.[3] Shen Minjuan (2021) studied and analyzed the resource input decision of the new energy vehicle supply chain in the cooperation and sharing mode, and put forward different production modes and resource input decisions selected by new energy vehicle enterprises under different resource input conditions.

2.2 Influencing factors of new energy vehicle production

At present, a large number of scholars at home and abroad have studied the production efficiency and influencing factors of automobile enterprises. Nandy (2011) used DEA to analyze the production efficiency and influencing factors of automobile enterprises in India, and put forward corresponding countermeasures for inefficient enterprises.[4] Zhang (2014) From the perspective of new energy vehicle producers, government subsidies and consumer trade-offs are introduced into the production decision-making process of new energy vehicle producers.[5] The research results of Shin et al. (2015) show that the fixed cost input of technological progress is an important factor in the production process of new energy vehicles, and the intermediate variable of new energy vehicles can influence the production decision of new energy vehicles.[6] The research of Li Nan (2020) expands the relevant research on the production decision of new energy vehicles, analyzes the influence of consumer preference payment premium, subsidy withdrawal and other factors on the production behavior of automobile enterprises, and describes the optimization of production decisions. New energy vehicles and traditional automobile enterprises are regarded as different enterprises for evaluation and analysis, and the different characteristics of new energy vehicles as an emerging industry are considered.

2.3 Cooperative production mode of automobile supply chain

In the context of sharing economy, cooperation among member enterprises in the new energy vehicle supply chain has become a trend. The parties cooperating in the production of new energy vehicles can provide complementary resources for joint resource allocation, so as to improve product quality. Aiming at the supply chain cooperation mode of the traditional manufacturing industry, some scholars have studied its production cooperation mode. Hadaya et al. (2012) show that the cooperative production between the supply chains of manufacturing enterprises can promote the co-creation of value and provide a lasting competitive advantage for the relevant partners.[7] There is also a significant positive correlation between collaborative innovation, knowledge sharing and enterprise innovation performance in cooperation. Wu et al. (2014)

proposed that manufacturing-led production cooperation can promote the innovation of enterprises. Compared with non-cooperative situations, the benefits of all parties in the supply chain and the total r & D benefits reach a higher level. Xu et al. (2020) divided the innovation investment of new energy vehicle resources into technology acquisition, R&D investment, environmental support, etc. They proposed that the cooperative relationship between industries can improve the production and innovation efficiency of new energy vehicles, and provide reference for new energy vehicle enterprises in cooperation and sharing.

To sum up, the production cooperation mode can bring greater benefits to the new energy vehicle supply chain enterprises, but there are very few studies on the influencing factors of the production mode selection. Based on this, this paper with the help of QCA analysis method, choose the mainstream new energy automobile brand manufacturers on the market, analyze the influencing factors of the production mode selection, solve the implementation of resource efficiency and revenue optimal production path, for new energy automobile enterprise manufacturing and resource investment strategy to expand new ideas.

3. Construction of the index system

Based on the resource base theory and the related theory of supply chain, this study analyzes the influencing factors affecting the production mode selection of new energy vehicles into five dimensions: environmental factors, technological innovation level, economic development status, market competition degree and industrial integration. The detailed indicators are shown in Table 1 below.

Table 1: indicators of influencing factors

dimension	influencing factor	evaluating indicator
Environmental factor	Human Resources Status	The proportion of enterprise personnel with bachelor's degree
	Product development	The number of new energy vehicles owned by the enterprise
	Production conditions of enterprises	Number of parent car factories that can be directly used by the enterprise
Technology innovation level	Technology innovation ability	Enterprise invention patent ownership amount
	Scientific research development ability	Growth rate of enterprise R & D expenditure
	Scientific and technological innovation strength	The proportion of scientific research and development personnel among the employees
	Investment status in scientific research	Science and technology research and development investment in the total revenue ratio
Economic development	capital position	Return on total assets
	profitability	Profit margin on corporate capital
	Financial ability	Asset-liability ratio of enterprises
	capax negotii	Growth rate of enterprise operating income
Market competition	Product market position	Domestic electric vehicle market share proportion
	Brand operation competitiveness	Car enterprise user operation competitiveness index
	brand awareness	Brand competitiveness index
	Customer service satisfaction degree	Customer satisfaction ranking
	Industrial	There is a agglomeration phenomenon centered on large

Industry amalgamation	agglomeration degree	enterprises
	Industrial and ecological coordination degree	Competitiveness index of automobile enterprises' industrial ecological construction layout
	Business process fusion	There are production, manufacturing process cooperation of the whole vehicle vehicle enterprises
	Technical acquisition capability	Intelligent manufacturing technology to obtain the competition index

4. Empirical analysis

4.1 Introduction of the QCA method

As a research method, QCA takes into account "configuration comparison" and "set theory". It is a new method beyond qualitative and quantitative. Both based on cases and computer algorithms, it can realize comparative analysis among different cases, and helps to find the similarities and differences of cross-case systems. This paper adopts the qualitative comparative analysis (QCA) method, which takes Boolean algebra operation as the core, and can explore the complex causal relationship between multiple independent variables and dependent variables. Qualitative comparative analysis method integrates the advantages of "case-oriented qualitative" and "variable-oriented quantitative" methods, which can ensure that the sample number can clearly reflect the action mode of conditional variables in the case of small samples.[8] The sample number of this paper is 13 companies. If empirical analysis is used, the sample size is too small to ensure the accuracy. Therefore, QCA analysis method is adopted to select 5 independent variables, 1 dependent variable and 13 samples for analysis to ensure the accuracy of the results.

4.2 Data collection and analysis

In this paper, 13 new energy vehicle companies are selected, analyze 19 related indicators that affect the choice of their production mode, and identify the configuration that determines their self-built or borrowed production mode. Following the suggestions of iss, the consistency was set to 0.8, and referring to the suggestions of Du Yunzhou et al., the threshold of PRI consistency was set at 0.70, the case threshold was set to 1, and 4 cases of self-built production mode and 9 cases borrowed from production mode were retained.[9]

4.2.1 Variable calibration and conversion

According to the types of variable pairs, QCA can be divided into three categories: clear set qualitative comparative analysis, multi-value qualitative comparative analysis and fuzzy qualitative comparative analysis. According to the characteristics of the data, fs QCA software is used to calibrate the original data to define the membership degree of the collection, and then the fuzzy set data is converted into the truth table. Combining the dual advantages of qualitative and quantitative analysis, the full membership, intersection and complete non-affiliation points were determined by adopting the universal upper quartile, mean and lower quartile. The outcome and conditional variables are calibrated with three critical values and transformed into a set concept.[10] According to the QCA method, use the variable calibration junction and assign the original data, and finally realize the variable conversion. The calibration is shown in Table 2 below.

Table 2 Calibration and aiming points of each variable

Variable	Kind	Full affiliation point	Cross point	No affiliation at all
Outcome variable	Annual production capacity of new energy vehicles	204600	43478	6477
	The proportion of undergraduate staff	0.738	0.62	0.246

Condition variable	Number of existing models	4	3	1
	Number of parent company	2	1	0
	Domestic invention patent ownership amount	1197.8	649	482.6
	Growth rate of R & D expenditure	1.534	0.41	0.08
	Proportion of scientific research and development personnel	0.54	0.34	0.146
	Ratio of scientific research investment to total revenue	0.284	0.12	0.05
	Return on equity	0.398	-0.01	-0.458
	Vehicle gross margin	0.226	0.13	-0.422
	asset-liability ratio	0.814	0.42	0.27
	Growth rate of domestic operating income	4.012	1.78	0.908
	Domestic market share	0.48	0.27	0.08
	Operational Competitiveness Index (out of 10)	10	8.8	7.66
	Brand competitiveness ranking	32	11	2
	Customer satisfaction score (out of 10)	9.78	8.4	7.3
	Enterprise production concentration degree index (full score of 10)	9.84	8.8	8.22
	Competition index of ecological construction layout (out of 10)	9.88	8.1	7.46
	Cooperation competitiveness score of complete vehicle enterprises (full score of 10)	9.78	8.7	7.58
	Competition index of intelligent manufacturing technology (out of 10)	9.62	8.2	7.3

4.2.2 Necessity analysis

According to the QCA method, the collected data was annotated and proofread by the variable strategy, and the proportion was assigned into the true value table, and then the necessity analysis of the individual variable was conducted to determine whether there was a sufficient or necessary relationship between the individual variable and the outcome variable. Necessity analysis is used to test whether the results rely on a certain variable. Generally, it determines whether there is a adequacy and necessity relationship between the conditional variable and the outcome variable by the two indicators of consistency and coverage. When the consistency is greater than 0.9, it means that the conditional variable is a necessary condition.[11] In this paper, fs QCA3.0 software is used to calculate the variable data, and the results of sufficient necessity of individual explanatory variables and the number of each variable are shown in Table 3.

Table 3 Results of the individual variable sufficient-necessity analysis

Condition variable	Consistency	Coverage
Proportion of undergraduate personnel (b1)	0.688468	0.673098
Number of existing vehicle models (b2)	0.802642	0.675498
Number of parent company automobile plants (b3)	0.741641	0.564915
Domestic invention patent ownership (b4)	0.616702	0.591521
R & D expenditure growth rate (b5)	0.600554	0.663304
Proportion of scientific research and development personnel (b6)	0.704779	0.655591
Ratio of scientific research investment to total revenue (b7)	0.602185	0.6204
Return on equity (b8)	0.654216	0.623698
Vehicle gross profit margin (b9)	0.735769	0.665143

Asset L (b10)	0.513945	0.516473
Domestic operating income growth rate (b11)	0.654216	0.708532
Domestic market share (b12)	0.925534	0.718187
Operational Competitiveness Index (b13)	0.781439	0.775117
Brand competitiveness ranking (b14)	0.391453	0.392093
Customer Satisfaction Score (b15)	0.789594	0.684531
Enterprise Production Cluster Degree Index (b16)	0.602022	0.554121
Competition Index (b17)	0.794487	0.715167
Cooperative competitiveness score of complete vehicle enterprises (b18)	0.783071	0.719682
Intelligent Manufacturing Technology Acquisition Competition Index (b19)	0.804273	0.771554

From the results of the necessity analysis, High agreement was obtained for most of the variables, And the consistency index of "domestic market share" is greater than 0.9, It shows that the proportion of enterprises in the new energy vehicle market share can become the necessary condition for the production mode selection of new energy vehicle enterprises, Meanwhile, its coverage index is about 0.71, Suggesting that the variable empirically explains about 71% of the cases; Although the higher level of agreement was also obtained for other conditional variables, But none have reached the ideal level of 0.9, Could not be considered necessary as an outcome variable, Both of the individual factors are weak, It shows that these variables need to cooperate with each other to have an impact on the production mode and capacity improvement. Therefore, it is necessary to further analyze the different combinations of the precursor variables to find their multivariate influence paths. From the single variable analysis results, the existing model number, parent car factory number, scientific research and development personnel proportion, vehicle gross margin, operating competitiveness, customer satisfaction index, competition index of ecological construction layout, vehicle companies cooperation competitiveness and intelligent manufacturing technology ability consistency of nine indicators are more than 0.7, to a certain extent, that the indicators of production mode and capacity to improve the influence degree is higher, these condition variables can be used as important explanatory variables of all case outcome variables.

4.2.3 Analysis of the results

Using QCA 3.0 software for this paper to build boolean minimization of truth table, the results variable for enterprise production capacity, contracted solution, intermediate solution and complex solution, referring to Ragin (2014), eliminate the simple and complex solution as the basis of the configuration conditions. The Boolean operation analysis results of the intermediate solutions are shown in Table 4.

Table 4 Table of the conditional combinations of the intermediate solutions

Condition combination		Combined variables of the intermediate solution	Original coverage	Unique coverage	Combination consistency	Overall coverage	Overall consistency
OEM production mode	A1	b1*b5*~b11*b12*~b14*b16*b19	0.3365	0.2749	1	0.83	1
	A2	b1*b4**b10*~b12**b17~b19	0.3175	0.2538	1		
	A3	b4*b5*b12*~b16*b17	0.1842	0.1386	1		
Self-built production mode	A4	b2*b4*b8*~b12*b13*~b16	0.2050	0.1685	1	0.87	1
	A5	~b2*b6*b8*b11*~b14*b18	0.2070	0.1145	1		

	A6	b6*b9*b12*b13*~b18	0.2116	0.105924	1		
	A7	b4*~b12*b14*b16*~b18	0.2422	0.1475	1		

When the output result of the selected outcome variable is 1, the combination consistency and overall consistency of the conditional combination are 1, and each conditional configuration is its sufficient condition. The overall coverage of the cause combination for each path is 0.83 and 0.87, respectively, with a consistency level higher than the set minimum theoretical value of 0.8. The explanatory power is relatively strong, indicating that all configurations can promote the improvement of production capacity of new energy vehicle enterprises. Therefore, based on the core conditions, three variable combinations of OEM production mode and four variable combinations of self built factory production mode can be sorted out separately.The seven combined paths can become sufficient conditions for the production capacity improvement of new energy vehicle enterprises. The results indicate that C is the core condition, c is the missing core condition, D is the existing auxiliary condition, d is the missing auxiliary condition, E is the possible existence of the condition, and may not exist. The specific combination results are shown in Tables 5 and 6. Among them, the conditions that exist in the simplified solution and intermediate solution are defined as core conditions, and the conditions that appear in the intermediate solution but are excluded by the simplified solution are defined as edge conditions.

Table 5 Analysis results of capacity improvement conditions of new energy vehicle enterprises (1)

OEM production mode			
variable	A1	A2	A3
b1	C	D	E
b4	d	D	D
b5	D	d	C
b10	E	C	d
b11	c	d	E
b12	C	c	C
b14	c	E	E
b16	D	E	c
b17	E	C	D
b19	C	c	E
consistency	1	1	1
raw coverage	0.336493	0.317542	0.184238
unique coverage	0.274882	0.253764	0.13862
solution coverage	1	1	1
solution consistency	1	1	1

Table 6 Analysis results of capacity improvement conditions of new energy vehicle enterprises (2)

Self-built production mode				
variable	A4	A5	A6	A7
b2	C	c	d	d
b4	D	d	E	C
b6	d	C	D	c
b8	C	D	D	E

b11	E	D	E	d
b12	c	d	C	E
b13	D	E	C	d
b14	E	c	E	D
b16	c	E	d	C
b18	d	C	c	c
consistency	1	1	1	1
raw coverage	0.205021	0.207003	0.211627	0.242237
unique coverage	0.168475	0.114512	0.105925	0.147545
solution coverage	1	1	1	1
solution consistency	1	1	1	1

From Table 4 to Table 6, the consistency and overall consistency of each path to the combination are 1, which constitutes a sufficient condition for the improvement of the production capacity of new energy vehicles. The consistency level of coverage is higher at 0.8 than the basic standard, indicating that each configuration can promote the optimal choice of the production mode of new energy vehicle enterprises. The basic intermediate solution and conditional combination analysis results can summarize the following seven combined pathways as shown in Table 7.

Table 7 seven combined pathways

	Condition combination	Combination path
OEM production mode	A1	b1*b5*~b11*b12*~b14*b16*b19
	A2	b1*b4*b10*~b12*b17*~b19
	A3	b4*b5*b12*~b16*b17
Self-built production mode	A4	b2*~b4*b8*~b12*b13*~b16
	A5	~b2*b6*b8*b11*~b14*b18
	A6	b6*b9*b12*b13*~b18
	A7	b4*~b12*b14*b16*~b18

4.3 Pathway analysis

4.3.1 Select the configuration of the OEM production mode

A1: b1*b5*~b11*b12* ~b14 * b16 * b19, the combination represents the intelligence-intelligent manufacturing-market-leading type. This condition combination represents that enterprises that attach importance to the development of high-level human resources, improve the acquisition ability of intelligent manufacturing technology and have stable market share have better production capacity improvement effect and choose better production mode when adopting OEM production mode.[12] In this paper, enterprise xiao peng is selected by quickly attract high-quality talents, improve the level of science and technology innovation and the efficiency of operation management, although in the early development may encounter poor management condition, weak brand competitiveness, but for enterprises with talent and intelligent technology advantage, but market share can make up for its economic situation and industrial integration but defects, and better but achieve capacity expansion.[13]

A2: b1*b4*b10* ~b12 * b17 * ~b19, the portfolio represents the capital-industry ecology-driven type. This condition combination represents that the capacity improvement of new energy vehicle enterprises is mainly driven by sufficient but financial capital and good industrial ecological construction layout conditions.[14] The drive mechanism of the typical case is wei to cars, analysis found that wei to car selection and jianghuai OEM production factory location in

Anhui, Anhui automobile industrial park ecosystem development rapidly, has formed a convenient industry ecological coordination environment, cost costs for the enterprise, fully tap local advantages, realize manufacturing cooperation, develop the external demand market provides convenient conditions. The good capital operation condition of NIO also makes up for the lack of technology acquisition ability and the slightly slow product update and iteration, and realizes the rapid production capacity increase for enterprises, so as to avoid external risks.

A3:b4*b5*b12*~b16*b17, the combination represents the scientific research investment-market-leading type. This condition configuration represents that when the new energy automobile enterprises that choose OEM production mode attach importance to the scientific research investment of their core technologies and have a good market share, the enterprises can still achieve production capacity improvement and high-quality production, although they do not have the advantage of industrial agglomeration or excellent capital operation status.[15,16] The representative enterprises of this path are Polar Fox and Zero Run. As two emerging new energy automobile enterprises, they attach importance to scientific research investment in the process of development and bring rich innovation resources to themselves. Due to the cumulative influence of innovation resources on enterprises, there is a lag, and the stable market share can help the two enterprises to realize complementary resource, improve production capacity, and stimulate the creative vitality and innovative development of enterprises.

4.3.2 Select the configuration of the self-built production mode

A4: b2 * b4 * b8 * ~b12 * b13 * ~b16, the portfolio represents the capital-product iteration drive type. This condition configuration represents that the enterprise takes advantage of its good capital situation and rapid product iteration characteristics to win its competitive advantage, optimize its own resource ability, and resist the competition with a special "internalization advantage".[17] The continuous emergence of new products will also enhance the innovation vitality of enterprises, combined with the support of sufficient funds, has spawned the development of high-yield production. The typical case under this driving mechanism is GAC Ian and geometry car. The two new forces rely on the old brands of traditional car companies to get capital, technology and equipment support, which provide convenient conditions for their own scientific and technological innovation and product iteration. Therefore, sufficient capital situation and efficient product iteration drive the expansion of new energy capacity of traditional car enterprises.[18]

A5: b2 * b6 * b8 * b11 * ~b14 * b18, the combination represents the leading type of scientific research-production cooperation. This condition combination represents that the improvement of high yield of new energy automobile enterprises is mainly affected by the investment of scientific research and development personnel and the integration ability of vehicle production cooperation business. With the influence of technology integration, some new energy automobile enterprises choose to carry out all-round cooperation with other vehicle enterprises in production design and manufacturing process. The sufficient investment of scientific researchers has an important impact on optimizing the industrial layout, strengthening technical cooperation, promoting the core scientific and technological innovation, and promoting the production capacity of enterprises.[19] The representative enterprise under this path is Ideal, Weima and which zha. Three companies pay attention to the production process, business process, management organization implementation related enterprise production cooperation and resource sharing, increase market interaction, reduce the transaction cost, with the help of sufficient scientific research personnel and technical cost, make up for the brand competition and profitability, achieve the capacity, promote enterprise long-term development.[29]

A6: b6 * b9 * 12 * b13 * ~b18, the portfolio represents the brand operation-market leading type. The combined model shows that the capacity improvement of some new energy vehicle enterprises that choose self-built production mode is mainly affected by strong brand operation and stable market share. Enterprises pay attention to brand operation, improve brand image, help enterprises to obtain customer satisfaction, stabilize the market position of new energy vehicles, and help the products and services of new power enterprises are promoted throughout the country. Such

enterprises mainly take advantage of digital economy technology and industrial agglomeration advantages to develop external market demand.[20] The representative enterprises of this model are Euler and Lantu. As the pursuit of branding and the pursuit of customer satisfaction for the principle of new forces, the two companies with the help of traditional depot of capital, technology, manufacturing advantages, focus on the enhance market competitiveness, enhance brand image, combined with the production factory good industry ecological construction layout, quickly realize the capacity, its economic vitality is fully released.

A7: b4 * ~b12 * b14 * b16 * ~b18, the combination represents the scientific research output-industrial agglomeration drive type. The driving model shows that new energy automobile enterprises that pay attention to the output efficiency of scientific research results can make up for the disadvantages of operating status and brand competitiveness by taking advantage of the local perfect and convenient professional industrial agglomeration advantage. The high efficiency of scientific and technological output and the advantages of industrial agglomeration help enterprises to obtain the support of capital flow, logistics and information flow, and realize the coordinated development with relevant industrial chains. The representative enterprise of this kind of driving model is Feifan Automobile. Fly who rely on the parent company geely automobile capital and technical support, accumulated a large number of invention patents and scientific research achievements, and realize the efficient transformation of scientific research and technology, Shanghai factory specialized industrial park and complete industrial chain to help new forces to realize the business process integration and the ability of intelligent manufacturing technology, and completed the production capacity, realize the innovative development.[21]

5. Research conclusions and recommendations

5.1 Research conclusion

This paper selects 13 new energy automobile enterprises released in 2017-2021, the data index using clear set qualitative comparison method to affect the internal and external factors of complex scenarios are studied, the following conclusions: 1, there is no single factors for new energy automobile enterprises to improve the core conditions, the result is produced by a variety of factors.2. The influencing factors of production capacity increase must appear in the form of combination, and the consistency and coverage rate of each configuration have reached more than 0.8. It can be seen that these configurations can well explain the influence of various influencing factors on production capacity improvement.3. Among various path combinations, strong market competitiveness and high scientific research investment are the single elements with the highest frequency among multiple factor combinations. For different production modes, both play an important role in improving their production capacity.[22] This study further points out that the increase of production capacity also needs to be combined with different elements such as capital operation, industrial agglomeration and brand operation.4. Based on different production modes, the combination of three OEM production modes and four production modes of self-built factories is obtained, and their characteristics and advantages are explained respectively, to provide reference for other enterprises.[31]

5.2 Insufficient studies

In this paper, there are still some deficiencies in the configuration analysis of capacity improvement, which needs to be improved in subsequent studies. On the one hand, due to the limitation of the degree of detail and the number of cases, the precondition variables proposed in this study are limited to some extent. The QCA method is used to explore the key combination factors affecting the capacity improvement of the enterprise, which cannot cover everything, and the thinking perspective is limited.[23] On the other hand, this study is a study of static cases, which cannot reflect the dynamic changes in the manufacturing process of enterprises. Therefore, we can

try to collect dynamic data and analyze the production choices of new energy vehicle enterprises in different development stages. As a future research direction.

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