

The Configuration Effect of Antecedents of Business Model Innovation: A Fuzzy-Set QCA Approach

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Abstract. From the three levels of external environment, organizational capabilities and personal traits, select three antecedents: institutional environment, digital capabilities and CEOs' temporary leadership to build a combined framework model that affects business model innovation, use fsQCA to conduct configuration analysis on 125 Chinese enterprises, and explores multiple concurrent factors and causal complex mechanisms that affect enterprise business model innovation. The research found that the driving factors of high level business model innovation can be divided into two types: leadership-capabilities orientation and capabilities-environment orientation. Among them, leadership-capabilities orientation has better universality than capabilities-environment orientation; The driving mechanism of non-high level business model innovation can be divided into three types: lack of digital capacities, poor institutional environment, lack of capabilities-poor environment, and there is an asymmetric relationship with the driving factors of high-level business model innovation.

Keywords. Institutional environment; digital capabilities; temporal leadership ; business model innovation; QCA

1. Introduction

Digital technologies make organizational boundaries more fluid and make organizations more dispersed in the innovation process[1]. In order to cope with the challenges brought by the rapid changes in the environment and the increasingly fierce competition under the digital transformation, enterprises need to identify key resources and redesign the business model. Business model innovation refers to the innovation of business process, organizational routines and cognitive paradigm. Business model innovation is a complex and systematic problem. At present, a large number of empirical studies have focused on the antecedents of organizational business model innovation. Internal resources help enterprises expand the boundaries and capital of organizational transactions, driving business model innovation[2]. Emerging technologies make the focus of enterprise value shift from value distribution to value creation, from value chain to value network, shifting the focus of value capture from corporate interests to the network as a whole, which has effectively promoted the creation of business models[3]. But existing scholars tend to attach importance to the net impact of a single factor, while ignoring the linkage of multiple factors. This paper takes institutional environment, digital capabilities and

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CEOs' temporary leadership as the antecedents of business model innovation, and analyzes the influence paths, mechanism and function of different configurations on business model innovation through fuzzy-set qualitative comparative analysis (fsQCA), aiming to reveal the interactive influence of different factors on business model innovation.

2. Literature review and model construction

2.1. Literature review

Business model innovation means reinterpretation the business model components in the new business framework and creating a new market ecosystem by providing unknown business values and processes[2]. With the development of the digital economy, more and more enterprises are combining traditional trading modes with new technologies, channels and customer needs to form new trading modes and drive business model innovation. Business model innovation is a complex coupling process, driven by a combination of various factors, and influenced by the external environment, the resources and capabilities of enterprises. Different combinations of different factors may also induce the same level of business model innovation.

2.1.1. Institutional environment and business model innovation

According to the theory of institutional economics, institutional factors will have a significant impact on enterprise innovation activities[5], different systems will lead to differences in the level of innovation activities. The institutional environment affects business model innovation through seeking legitimacy. Legitimacy provides a good environment and support for enterprise innovation activities, enhances the sense of identity of stakeholders to enterprise innovation behavior, and reduces the cost and risk of enterprise business model innovation. The government mandatory regulatory environment policy can encourage enterprises to invest more resources, stimulate innovation behavior, and improve their innovation performance. The interaction between organizational and institutional environment drives innovation.

2.1.2. Digital capabilities and business model innovation

Enterprises with strong digital capabilities show high resilience in the face of environmental uncertainty and dynamic performance. Digital capabilities enable enterprises to cross organizational boundaries, overcome time and space constraints, expand opportunities for enterprises to obtain resources, improve the efficiency of resource integration and use, and promote business model innovation by affecting internal business processes. At the same time, organizations can use digital capabilities to overcome the inertia of organizational business models due to the passage of time, and achieve incremental business model innovation.

2.1.3. CEOs' temporary leadership and business model innovation

CEOs' temporary leadership refers to the degree of action and thinking in the time dimension during the interaction between CEO and subordinates, arranging deadlines, synchronizing team members' time behavior and allocating time resources. As the highest decision maker of organizational strategy, CEO communicates complex time frames with organizational members through temporary leadership, promotes time coordination within the organization, and creates a coherent internal time structure so that the organization can better adjust their internal time, rhythm and work cycle to adapt to the external environment in a timely manner. CEOs' temporary leadership can improve the efficiency of team innovation by balancing the performance needs of multiple innovation teams within the organization [6] .

2.2. Model building

The framework involves regulatory environment, normative environment, cognitive environment, digital perception capabilities, digital operational capabilities, digital resource collaboration capabilities and CEOs' temporary leadership. The configuration model of enterprise business model innovation is constructed to explore the complex causal mechanism affecting enterprise business model innovation.

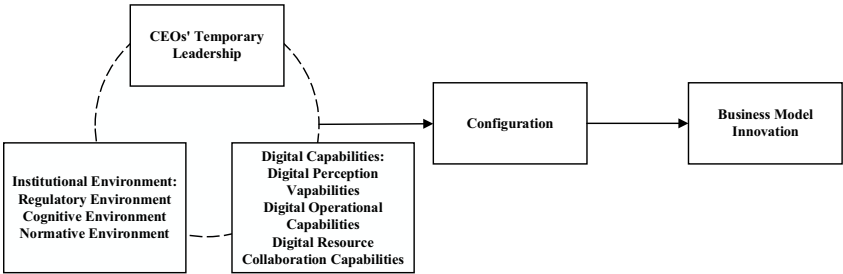


Figure1:The configurational framework of business model innovation.

3. Research Methods and Design

3.1.Variable selection and measurement

CEOs' temporary leadership measurement method refers to Mohammed (2011)[7] ,a total of 7 items. Institutional environment measurement method refers to the scale developed by Busenitz (2000) [8], a total of 13 items. Digital ability measurement method refers to the research of Warner (2019)[9], a total of 15 items. The measurement method of business model innovation refers to the scale proposed by Zott [10], and makes appropriate modifications on this basis, a total of 8 items.

3.2. Data collection and reliability and validity analysis

This study used SPSS 22.0 and Mplus 8.0 software to test the reliability and validity of the scale. The minimum CITC of each item in the scale is 0.606 ,and the minimum

Cronbach's α coefficient of each variable was 0.882. The α coefficient after deleting items is less than the total α coefficient of variables, and the reliability of the scale is high. The minimum loading coefficient of confirmatory factor analysis is 0.655, KMO is 0.917, cumulative explained variance is 78.21 %, the minimum AVE is 0.6372, the minimum CR is 0.8131[11][12]. The square root value of each factor AVE was greater than the correlation coefficient with other factors, and the discriminant validity of the questionnaire was good. $X^2 / df = 2.227$, RMSEA = 0.099, RMR = 0.039, CFI = 0.924, IFI = 0.926, TLI = 0.902.

4. Data analysis

4.1. Data calibration

In this paper, the maximum, mean and minimum values of variable scores are calibrated as fully in, crossover point and fully out.

4.2. Analysis of necessary conditions

If the consistency coefficient is greater than 0.9, the antecedent may be considered as a necessary condition for the result [13]. All the conditions consistency are less than 0.9, so the antecedent variables do not constitute a necessary condition for the results.

4.3. Configuration analysis

This paper uses fsQCA3.0 software for analysis. The minimum case frequency threshold is 1, the original consistency threshold is 0.8, and the PRI consistency threshold is 0.75 for standardized analysis.

Table 1:Configurations

Antecedent condition	High level business model innovation		Non high level business model innovation						
	H1	H2	NH1			NH2		NH3	
	1	2	3a	3b	3c	3d	4a	4b	5
TL	●	⊗	⊗					⊗	●
DP	●		⊗	⊗	⊗	⊗			⊗
DO	●	●	⊗	⊗	⊗	⊗	⊗		⊗
DRC	●	●	⊗	⊗	⊗	⊗	⊗	⊗	●
RE		●		⊗	⊗	●	⊗	⊗	●
CE	●	●			⊗	●	⊗	⊗	⊗
NE		●		⊗		●	⊗	⊗	⊗
Raw coverage	0.668	0.415	0.686	0.602	0.620	0.475	0.611	0.585	0.376
Unique coverage	0.319	0.066	0.049	0.003	0.009	0.014	0.013	0.018	0.013
Consistency	0.969	0.973	0.960	0.967	0.963	0.979	0.966	0.968	0.986
Solution consistency		0.967				0.940			
Solution coverage		0.734				0.809			

Note: ● core casual condition (present), ● peripheral casual condition (present), ⊗ core casual condition (absent), ⊗ peripheral casual condition (absent), blank spaces indicate “do not care”.

4.3.1. *Analysis of high-level business model innovation configuration*

H1: leadership-capabilities orientation. This type consists of path 1, specifically TL*DP*DO*DRC*CE. When CEO has a high level of temporary leadership and digital capabilities, enterprises with good cognitive environment will have a high level of business model innovation. CEO with high level of temporary leadership can coordinate work processes and task completion time within the organization, and form an atmosphere within the organization to actively complete innovative tasks, adapt to environmental changes, and enhance employees' organizational identity. A good cognitive environment will provide more opportunities for organizations to contact innovation, so that innovation teams can obtain rich technology and knowledge from external organization, and improve the level of organizational innovation. The digital perception capabilities will enhance the opportunity recognition capabilities of enterprises, promote cross-border knowledge search, and bring rich heterogeneous digital knowledge related to business model innovation. Based on the resource-based view, rich heterogeneous knowledge is an important prerequisite for enterprises to carry out innovation activities. Digital operational capabilities and digital resource collaboration capabilities could transfer, share, integrate the digital knowledge, reduce knowledge redundancy, and apply knowledge to enterprise innovation activities.

H2: capabilities-environment orientation. This type consists of path 2, specifically ~TL*DO*DRC*RE*CE*NE. When the government formulates policies and systems to support enterprises to carry out innovation activities, it helps enterprises break through their own resource constraints, reduce the cost of enterprise innovation, organizations can use more resources for innovation. The public's recognition and praise of innovation activities will enhance the creative atmosphere in the region and enhance the organization's willingness to innovate. A good cognitive environment makes it easier for organizations to acquire knowledge and experience to improve their entrepreneurial capabilities, stimulate high level innovation willingness and high risk entrepreneurial spirit. The support of policies, high recognition of innovation behavior by society, adequacy of information and knowledge in the social environment will promote entrepreneurial innovation. The good institutional environment expands the physical boundary of enterprise knowledge acquisition, integrates with the internal digital operation capabilities and digital resource coordination capabilities, strengthens the process of enterprise acquisition and utilization of digital knowledge.

4.3.2. *Analysis of innovation configuration of non high-level business model*

NH1: lack of digital capabilities. This type consists of four paths of 3a, 3b, 3c and 3d. When enterprises lack digital capabilities, no matter whether the institutional environment is good or not, CEOs' temporary leadership will lead to low level business model innovation. In this type, the lack of internal digital capabilities may inhibit the willingness of enterprises to innovate. In the absence of digital capabilities, enterprises cannot actively adapt to the dynamics, complexity, and ambiguity of environmental changes, and cannot obtain sufficient knowledge related to environmental changes in a timely manner. Enterprises tend to operate and develop under the existing business model framework, resulting in non-high level business model innovation.

NH2: poor institutional environment. This type consists of paths 4a and 4b. When enterprises lack good institutional environment and capabilities to coordinate digital resources, the lack of digital operational capabilities or the low level of CEOs' temporary

leadership will lead to low level business model innovation. When the external environment does not encourage innovation, it is difficult for enterprises to obtain resources from the outside. Enterprises are fear of innovation. When the external environment lacks support for enterprise innovation, the heterogeneous knowledge mastered by enterprises is insufficient, and the CEOs' temporary leadership is not strong. It is difficult to coordinate the time flow of innovation tasks within the organization, the organization time management is chaotic, and individual members are vague about the completion time of innovation tasks.

NH3: lack of capacities-poor environment. This type is consists of path 5, specifically TL~DP~DO*DRC*RE~CE~NE. When the level of enterprise digital perception capabilities and digital operational capabilities, cognitive environment and normative environment is poor, even if the CEOs' temporary leadership level and digital resource coordination capabilities are high, and the cognitive environment is good, it still cannot produce high-level business model innovation. In this type, although the innovation tasks within the enterprise can be effectively arranged and coordinated, and the individual willingness to innovate is strong, but due to the lack of digital capabilities and poor institutional environment support, it is difficult for enterprises to actively take the pace of innovation.

4.4. Robustness check

In this paper, the original consistency threshold is reduced from 0.8 to 0.75 [14]. It is found that the overall consistency of the antecedent variables decreases slightly, and the overall coverage increases slightly, but the results still support the above five types. In addition, we deleted 10 original cases for re-analysis, and the results are still similar, indicating that the data studied in this paper is robust.

5. Conclusion

5.1. Research conclusion

(1) Enterprise business model innovation is influenced by interaction of institutional environment, digital capabilities and CEOs' temporary leadership. (2) Through configuration analysis, we found two types of configuration that drive enterprise business model innovation: leadership-capabilities orientation and capabilities-environment orientation, and three types that inhibit enterprise business model innovation: lack of digital capabilities, poor institutional environment, lack of capabilities-poor environment. Compared with capabilities-environment orientation, leadership-capabilities orientation can more effectively drive high-level business model innovation. (3) There is result asymmetry between high-level and non-high level business model innovation driving mechanism, that is, the factors driving high-level and non-high-level business model innovation are not opposite.

5.2. Theoretical contribution

(1) This paper reveals the synergy and matching among institutional environment, digital capabilities and CEOs' temporary leadership by explaining the complex mechanism that

affects business model innovation. This study enriches the literature on multiple level factors affecting business model innovation, and explores the impact mechanism of business model innovation from a holistic perspective. (2) This paper not only enriches the research on the influencing factors of business model innovation, reveals the equivalent driving mechanism, but also provides a new research method and expands the application scope of QCA method.

5.3. *Management inspiration*

(1) CEOs' temporary leadership has an important impact on enterprise business model innovation. CEOs should enhance the innovation willingness of organizational members through the collaborative management of the time concept of organizational members. (2) Enterprises should scientifically analyze their specific institutional environment and explore a business model innovation path suitable for the specific characteristics of enterprises. (3) This paper reminds enterprises to strengthen the construction of digital capabilities within the organization to adapt to the impact and influence of environmental changes on business model paradigm in the digital era.

5.4. *Limitations and prospects*

(1) The enterprise samples studied in this paper do not specifically distinguish between industry types. Follow-up research can specifically study the influence of the antecedent configuration of business model innovation in an industry. (2) The number of samples studied in this paper is less than that of empirical research, and there may be a limited diversity problem and subsequent research can expand the sample. (3) This paper only focuses on the impact of institutional environment, digital capabilities and CEOs' temporary leadership on business model innovation, follow-up studies can build a more comprehensive model from different perspectives and theoretical basis.

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