

Editorial: QCA methodology and causal complexity of management studies in China

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1. Introduction

Research methodologies are the foundational pillars to explore the world and develop and test theories (Du *et al.*, 2024a, 2024b, 2024c; Sun *et al.*, 2020a). Many phenomena studied in the social sciences involve complex causal relationships that require appropriate methodologies to understand these multifaceted patterns effectively. Since causal complexity involves interdependent concepts, scholars studying these patterns also need to use a holistic approach to evaluate how concepts work together in combinations and how these combinations lead to outcomes (Meyer *et al.*, 1993; De Crescenzo *et al.*, 2020; Furnari *et al.*, 2021; Du and Jia, 2017; Du and Kim, 2021).

Complexity and holistic thinking are consistent with Chinese traditional philosophy that emphasizes *harmony between heaven and humans* (Tian Ren He Yi, 天人合一). According to *Tian Ren He Yi* philosophy, heaven and humans should be viewed as a whole and undivided between each other. The two entities are interdependent and mutually reinforcing. From this holistic perspective, studying Chinese management practices requires scholars to use methodologies that allow for interdependent explanations or “recipes,” and these recipes may involve complex relationships between starting conditions and their outcomes. However, conventional statistical methods operate with the assumption of independence between variables, reveal the “net effect” of independent variables by controlling the effects of other factors, establish linear relationships between independent and dependent variables and presume causal symmetry for both the presence and the absence of outcomes. Thus, conventional statistical methods cannot effectively explain causal complexity and provide a complete picture of the underlying mechanisms.

For this goal, scholars must develop new methodologies emphasizing holistic and interdependent analytical features. We argue that using a configurational perspective and set-theoretic fuzzy-set qualitative comparative analysis (fsQCA) empowers scholars to analyze causal complexity appropriately. By treating cases as configurations of conditions, scholars can be better equipped to evaluate the complexities and dynamic nature of Chinese management phenomena (Kumar *et al.*, 2022; Du and Jia, 2017).

The set-theoretic QCA method is becoming more widely accepted across the social sciences due to its advantage of explaining causal complexity. This method has been applied to many topics in management, including identifying growth strategies, evaluating innovation ecosystems and business model formulation, as well as used in other related fields such as entrepreneurship, marketing, human resource management and information systems



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management (Ragin, 2008; Rihoux and Ragin, 2009; Greckhamer *et al.*, 2018; Kraus *et al.*, 2018; Woodside *et al.*, 2018; Dusa, 2019; Fainshmidt *et al.*, 2020; Du *et al.*, 2021).

Although management scholars are interested in configurational theories explaining causal complexity, several factors make it challenging to theorize complexity by depending solely on existing frameworks. First, configurational explanations must incorporate reasons that multifaceted interdependence exists among the conditions rather than their independence (Furnari *et al.*, 2021; Park *et al.*, 2020). While research continues to show that conditions leading to outcomes studied in management do not act in isolation but interact with each other (Razmdoost *et al.*, 2020), we still lack consistent application of this interdependent thinking in practice. For example, many entrepreneurship studies rely on explanations that focus on individuals or ventures to identify, evaluate and exploit opportunities (Shane and Venkataraman, 2000), despite configurational explanations in classical theories (Schumpeter, 1934) and contemporary reevaluations of entrepreneurship research that highlight holistic actions involving multilevel mechanisms and multi-agent interactions across digital platforms (Nambisan *et al.*, 2018; Kim *et al.*, 2016).

Second, while many management theories may explicitly or implicitly acknowledge the causal complexity behind the phenomena they focus on, they often fail to explain them because of their methods. Management research relies predominantly on linear regression techniques, and as a result, findings from these studies can only address management phenomena from the perspective of linear relationships (Delbridge and Fiss, 2013; Du and Jia, 2017; Sun *et al.*, 2020b; Sun, 2021). As a result, linear-regression-based findings cannot fully explain the complex interdependencies that occur when entrepreneurial processes unfold (Fisher, 2012).

Finally, conventional regression methods are unsuitable for analyzing causal asymmetry, so past research cannot be a reliable source for new research on these relationships. As a result, scholars need to develop separate rationales for the presence and the absence of an outcome. For example, the reasons for enterprise growth and decline or mechanisms for entrepreneurial success and failure can differ in each direction and require different antecedent conditions (Du and Jia, 2017). Since linear regression methods assume the same reasons apply for the presence and the absence of outcomes, past research typically cannot explain causal asymmetry adequately (Woodside, 2016; Du and Kim, 2021). Since Chinese management practices often exhibit interdependent conditions that lead to causally asymmetric relationships, we argue that configurational theorizing and methods will reveal more accurate explanations (Fiss, 2007, 2011; Misangyi *et al.*, 2017; Du *et al.*, 2021; Su *et al.*, 2019).

2. Preview of the special issue

In this special issue, we feature six QCA-based studies on entrepreneurship, ecosystems of doing business, international business and organizational behavior. The articles offer theoretical and practical insights into management in China's dynamic and complex environments. They also apply existing QCA techniques or develop new QCA methodology to analyze causal complexity associated with Chinese management. The six articles published in this special issue were selected from 20 submissions using a double-blind peer-review process. In this section, we summarize the key points of each article.

The first article by Li, Du, Sun and Xie explained how effective ecosystems in doing business achieve high living standards. They explored how the elements of ecosystems of doing business influence carrying capacity and transaction costs and, in combination, affect living standards. They considered both the framework and systemic conditions of the business ecosystem. Specifically, the framework conditions, called government and market logic, consist of market demand, physical infrastructure and government size. The systemic conditions include human capital, innovation capacity and financial access. They used necessary condition analysis (NCA)

and fuzzy-set qualitative comparative analysis (fsQCA) to examine 263 cities in China. Their results showed that high living standards are not based on single conditions but because of the joint effect of potentially substitutable environmental elements such as a high level of human capital, innovation capacity, financial access and market demand. They also identified and named two effective types of ecosystems of doing business – *market dominance* and *government-market logic mutualism/symbiosis* – as leading to high living standards. Their analysis indicated several pathways for governments to achieve high regional living standards. Based on these findings, government support for market efficiencies and resource allocation can improve regional living standards with an invisible or nudging hand.

In the second article, Liu, Zhang, Xi, Liu and Meng aimed to explore the distinctive configurations of organizational internal and external environments and work characteristics in the digital age that can foster a high level of employee innovative behavior. The internal environments include CEO entrepreneurial orientation, organic organizational structure and dynamic capability. The external environments contain technology uncertainty and digital transformation. The work characteristics include job complexity and career prospects. They used a multilevel survey design to acquire data from 88 CEOs and 693 employees from 88 startups and growth firms. The results contain six solutions for promoting and inhibiting employee innovative behaviors. The six promoting configurations are categorized into three driven modes:

- (1) all-factor driven mode;
- (2) alignment of digital transformation and work characteristics driven mode; and
- (3) alignment of internal environment and work characteristics driven mode.

They explained their results using social-information-processing theory, portraying the external environment as social information, the internal environment as information input and transmission, the work characteristics as information processing and coordination and the employee innovative behavior as information sharing and integration. In addition, their study highlights the pervasive role of job complexity and good career prospects in motivating employee innovative behavior by exploring both high and not-high configurations of employee innovative behavior.

In the third article, Wang, Xiao and Jia focused on how multiple management-decision tools work together in a configurational manner to deal with organizational wicked problems and proposed heuristic toolkits for tackling them. They used an exploratory approach by conducting semi-structured interviews to collect data from 53 senior executives from 26 high-tech enterprises. Their configurational theorizing process of scoping, linking and naming used grounded theory to identify six antecedent conditions: change adaptation, goal performing, administration, mechanical integration, organic integration and entrepreneuring. These conditions formed their theoretical framework that revealed potential countermeasures of organizational wicked problems. Based on existing literature, they also explained the potential interactions among the six antecedents. Finally, they named three heuristic toolkits – *synergy-oriented heuristics*, *institution-oriented heuristics* and *innovation-oriented heuristics* – derived from their crisp-set qualitative comparative analysis. By revisiting the cases they had interviewed, the authors captured the salient features of organizational wicked problems that can be identified and actively addressed by managers corresponding to the three heuristic toolkits and then form a match or fit between wicked problems and practical heuristic decision toolkits.

The fourth article by Yang, Lao, Zhou and Liu departed from the existing studies that mainly view participation in the Belt and Road (BRI) Initiative as dichotomous. Instead, they used a complex-systems perspective to investigate how cooperation priorities of provinces in

the Belt and Road Initiative are configured to impact province-level regional resilience. In their research, the diversity and consistency of the four cooperation priorities (namely *infrastructure connectivity*, *unimpeded trade*, *financial integration* and *people-to-people bonds*) contribute to the resilience of the regional economy. They are context-dependent on regional buffering capacity and government attention allocation. Their fsQCA analysis of textual and statistical data at the Chinese provincial level from 2013 to 2020 revealed intriguing configurational patterns:

- financial integration is critically important with provincial governmental attention allocated to BRI involvement;
- unimpeded trade coincides with a strong buffering capacity of a province to external shocks for achieving economic resilience;
- while unimpeded trade and people-to-people bonds are substitutable, infrastructure connectivity relies on unimpeded trade; and
- the presence of limited cooperative priorities leads to non-high levels of regional economic resilience.

Such configurational thinking contributes to the BRI literature by treating the provinces' participation in this supranational organization as an interconnected complex system embedded in a broader regional environment.

In the fifth article, Bao, An, Wang and Luo conceptualized effectual entrepreneurship as a means-driven approach to deal with environmental uncertainty and explored the interconnectedness and complexity of entrepreneurs' means. In particular, the authors integrated environmental uncertainty and three types of entrepreneurs' means using the dimensions of *what they are*, *whom they know* and *what they know* from the effectuation framework. Such configurational theorizing represents a holistic approach to evaluating the reasoning of entrepreneurs, which lacks relevant empirical evidence despite its clear conceptual foundations. Based on a fsQCA analysis of 54 entrepreneurs, the authors identified four pathways toward effectuation: novice-specialist in a highly uncertain environment, socialite-specialist in a highly uncertain environment, pure-specialist and resource effectual entrepreneurship. Conversely, when faced with environmental uncertainty, entrepreneurs lacking entrepreneurial experience, social networks or specialized knowledge will not be able to achieve high effectuation. The results also revealed distinctive effects of the entrepreneurs' means for effectuation. While specialized knowledge (*what they know*) is present across configurations for effectual entrepreneurship, entrepreneurial experience (*who they are*) and social networks (*whom they know*) may produce a counterproductive outcome. Thus, rather than considering a single, unified package of means for effectual entrepreneurship, this study offers entrepreneurs a toolkit to use these elements in different ways, which may be particularly relevant when navigating turbulent environments that require more flexibility than when operating in stable environments.

The last article by Roh, Park and Xiao integrated the resource-based view (RBV) and configurational approaches to investigate how MNE's subsidiary performance depends on how diverse subsidiary capabilities work effectively in combinations. The authors argued that when facing fierce local competition, MNE subsidiaries must create market opportunities by leveraging and configuring international, learning and dynamic capabilities. Although resource interdependencies are a central focus in RBV, how these subsidiary capabilities are complementary and/or substitutive to reach high levels of subsidiary performance remains unexplored. To address this issue, the authors used fsQCA to investigate the configuration of six subsidiary capabilities, i.e. TMT international orientation,

international entrepreneurship, market experience, networking capabilities, sensing and seizing based on a survey of 172 Korean MNEs in China. Their results revealed conjoint, equifinal and asymmetric relationships among subsidiary capabilities for performance in China. This means that developing a single capability does not guarantee the success of MNEs' subsidiaries in an uncertain global context. Managers of MNE subsidiaries need to recognize, integrate and reconfigure international, learning and dynamic capabilities in specific ways to adapt to the complex host-country environments of emerging markets.

3. Future research directions

Although the six articles contribute to a better understanding of causal complexity occurring Chinese management studies, we foresee other applications of QCA to studying the themes related to the holistic and interdependent aspects of *Tian Ren He Yi* philosophy. In this section, we describe several ways researchers can adopt extensions of the QCA method to study complex and dynamic phenomena.

3.1 Using QCA to study complex causal mediation processes

Given the causal complexities in innovation and entrepreneurial management processes, we recommend researchers incorporate set-theoretic mediation models into their research designs and analysis. [Du et al. \(2024c\)](#) provided practical guidance for implementing set-theoretic mediation models to analyze how multiple conditions interact and unfold across multiple stages more precisely. Their technique allows researchers to develop and test mediation models based on necessity and sufficiency relations between conditions and outcomes. [Du et al. \(2024a\)](#) described the steps to combine QCA with conventional statistical analyses to examine complex mediation models. This approach offers researchers a way to combine different methods to achieve their research objectives comprehensively. As these techniques are used more widely in innovation and entrepreneurship research, we envision that these studies will yield more in-depth insights into complex causal relationships found in these contexts and associated with theories in these domains.

3.2 Using QCA to study complex growth patterns

While most QCA studies rely on cross-sectional data without incorporating time into their study designs, we see new possibilities for conducting longitudinal analysis using QCA methods ([Furnari et al., 2021](#)). Since regression-based studies in management routinely incorporate temporal dimensions, we see this omission in studying dynamic changes of complex causal processes as a significant opportunity for new extensions in QCA research. Firms and managers operate in fast-changing environments, especially as digital technologies become more integrated into day-to-day processes. We recommend using the Growth Pattern QCA technique described by [Du et al. \(2024b\)](#) to design and study these complex causal temporal processes. They provide details about existing techniques for integrating time-based features into a QCA study and introduce the Growth Pattern QCA technique based on growth slopes for studying complex growth dynamics. This technique applies to situations when multiple conditions have different growth rates, and these differential rates contribute to different configurations that are sufficient for an outcome. Researchers can incorporate growth rate and turbulence conditions into their analyses and study these temporal dynamics at multiple levels (individuals, organizations, industries, regions and other levels).

3.3 Using mixed-method designs with QCA

While using solely QCA can be appropriate for a given research objective, we encourage researchers to adopt mixed-method designs with other techniques to conduct their studies more comprehensively. Many examples of combining QCA with other methods have already been reported, such as case studies, grounded theory and other qualitative methods; HLM, SEM and other statistical analyses (Meuer and Rupietta, 2016; Crilly *et al.*, 2012). Mixed-method designs with machine learning and QCA are also possible, such as using unsupervised machine learning (LDA) to determine the number of topics and measurement of conditions, and then using QCA to analyze the combination of antecedent conditions (Ingrams, 2023).

With mixed-method designs, each method can strengthen the others when used together and can be combined for various reasons. The most common option is when one method produces the conditions, and QCA can be used for configurational investigations (Meuer and Rupietta, 2016). For example, in the third article, Wang, Xiao and Jia used a grounded theory method to form the conditions, followed by QCA. Alternatively, QCA can produce configurations for an outcome and calibrate the cases' membership scores in the configurations, which can be used in other quantitative or qualitative analyses. For example, Du *et al.* (2024a) developed a complex mediation model, generated configurations of doing business for high innovation activity (mediator) with QCA and then used the cases' membership scores in each configuration as explanatory variables in subsequent mediating statistical analyses. A third option is to use QCA to check the robustness of results based on a different method. We encourage researchers to develop new mixed-method designs that integrate QCA with other methods (like explainable machine learning) for further methodological innovations that help evaluate complex causal relationships more comprehensively. These innovations may lead to new theoretical insights and empirical findings that may not be possible with QCA alone. At the same time, we caution researchers to understand the differences between the underlying assumptions between the methods and combine them in ways that bridge these differences. Understanding these differences helps researchers to integrate the strengths and avoid potential conflicts between them. For example, the set-theoretical basis of QCA and its necessary and sufficient relationships operate differently than the correlational basis in statistical relationships generated by regression analysis (Du *et al.*, 2021; Wellman *et al.*, 2023).

Given the growing adoption of QCA techniques in innovation and entrepreneurship research (Kumar *et al.*, 2022), we encourage researchers to use the methodological advancements we have described in their empirical designs to deepen their analytical insights. At the same time, we recommend that researchers use best practices for conducting QCA research and ensure that their study designs generate accurate findings and conclusions. Greckhamer, Furnari, Fiss, and Aguilera (2018) provided a helpful list of these best practices covering different parts of a QCA study design relevant for basic and advanced QCA research studies.

4. Conclusion

As digital and artificial intelligence (AI) technologies become more sophisticated and adopted, social and political instabilities increase and economic conditions continue to fluctuate, organizations will face increasingly complex and dynamic operating environments. Within these contexts, organizations will likely have to use different configurations of management and governance practices to achieve high performance. To fully understand how these conditions work together as necessary and sufficient relations, we advocate a holistic analytical approach appropriate for evaluating the rapid pace of changes within these complex systems (Park and Mithas, 2020; Du *et al.*, 2021). Configurational theorizing will enable researchers to explain more comprehensively how organizations

combine existing capabilities and traditional resources with new opportunities and technologies to achieve highly sustainable competitive advantages in fast-changing environments. Since some strategies may involve short- and long-term processes and in different stages of evolution, researchers may uncover different combinations (or recipes) to describe the range of capabilities organizations need to achieve high performance and other successful outcomes. By adopting study designs that capture the interdependent and holistic features that dominate *Tian Ren He Yi* philosophy, we anticipate researchers will uncover comprehensive explanations of our highly complex and dynamically changing world.

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