A study on the impact of environmental and organizational factors on the effectiveness of platform-based transformation -Qualitative comparative analysis based on fsQCA

Chen Xinhui
North China University of Technology
School of Economics and Management, PR China

Li Yaping
North China University of Technology
School of Economics and Management, Beijing, PR China

Abstract
Driven by the new generation of digital intelligence technology, the platform economy has emerged as an important force to drive industrial development and enterprise growth, and how to improve the effectiveness of enterprise platform-based transformation has become an important issue. This paper uses a sample of 30 domestic listed enterprises and adopts the fuzzy set qualitative comparative analysis (fsQCA) method to select six representative factors from two dimensions, namely environment, and organization, to explore the effect of the grouping effect on the effectiveness of platform transformation of enterprises. The study found that there are three ways to help companies achieve high platform transformation effectiveness, namely digital level + managerial cognitive ability, digital level + resource allocation ability, and government support + resource allocation ability, as well as three paths that lead to low platform transformation performance. The findings suggest that companies can, on the one hand, strive to improve certain key elements and move towards similar paths according to their circumstances, or, on the other hand, make organizational changes to shift to favorable paths and avoid unfavorable ones. This study not only extends the theoretical research on the impact paths of platform-based transformation but also provides valuable references on how companies can develop platform-based transformation strategies.

1 Introduction

With the rapid development of the Internet of Things, cloud computing, and other emerging digital intelligence technologies, platforming has become a strategic choice to promote the stable development of enterprises in the digital economy. As cross-border competition intensifies and many industries face the challenge of survival and growth, enterprises have to adopt the strategic behavior and development concept of platform-based transformation to adapt to the digital economy environment, grasp the competitive initiative, and achieve rapid growth. Over the past decade, the platform-based transformation has been practiced extensively within the industry and by some large enterprises with industry influence, facilitating rapid growth. For example, to respond to the development of the digital era, Haier Group has vigorously carried out organizational changes, built innovation platforms, manufacturing platforms, and other sub-platforms, and successfully transformed into a platform-based organization by actively practicing the concept of platform-based transformation. The platform-based transformation has become an effective way for enterprises to adapt to the digital economy, grow out of crises, and gain sustainable competitive advantages.

Platformisation has also been a hot topic of research in academia in recent years. Most of the existing literature focuses on the positive effects of platformistation, arguing that platform transformation is conducive to the survival, growth, and building competitive advantages of enterprises, but in reality, many enterprises have failed to achieve the expected results of platform transformation. So, what are the reasons for this phenomenon? To this end, existing scholars have, on the one hand, constructed theoretical models of the factors and processes affecting platform transformation to explain the complex process of platform transformation. The existing literature mostly explains the drivers of the platform transformation process from both internal and external perspectives, among which Ciborra C U. (1996) argues that with the evolution of the industrial organization, a specialized division of labor has facilitated the platform transformation and Inoue. Based on evolutionary theory, Ciborra C U. (1996) suggests that external technological change is an external driver of platform transformation. Jiang J H.(2017)both summarises the key internal and external core elements in the process of platform-based transformation and emphasizes the dynamic interconnection between elements in platform-based transformation activities. Later scholars further incorporated factors such as external environment and organization into the platform-based transformation model, enriching the research on the drivers of platform-based transformation. On the other hand, Han M Y.(2017) has analyzed the impact of organizational capabilities on platformistation transformation through empirical studies, intending to explore in-depth the mechanism of the role of a certain factor on platformisation transformation. However, due to the differences in resources, capabilities, and environment among enterprises, the mechanisms of platform transformation also vary. Although many scholars believe that the effectiveness of platform transformation is the result of multiple factors, the existing regression research methods can only explain the independent effects of a few factors, the variability in the effectiveness of platform transformation among enterprises, and the diversity of paths to achieve it are less well explained.

Therefore, this paper adopts the fsQCA research method to explore the synergistic effect of multiple factors on the effectiveness of platform transformation. This paper explores the impact of a two-tier grouping of internal and external organizational factors on the effectiveness of platform transformation, to remedy the shortcomings of the previous causal regression and case study approaches. Based on the literature and theories, this paper uses the fsQCA research method from the holistic perspective of environmental and organizational factors to investigate the relationship between different groups of environmental and organizational factors and the effectiveness of platform transformation and to explore the path to enhancing the effectiveness of platform transformation.

2. Literature review and model construction

Platform transformation is an important development concept for enterprises to adapt to the digital economy and gain a sustainable competitive advantage, through disintermediation" and "disintermediation", the integration of cross-border resources to meet the needs of users, to achieve rapid development of enterprises. The concept of "disintermediation" and "disintermediation" is a way to integrate resources across borders to meet user needs and achieve rapid growth. Initially, scholars have taken an evolutionary perspective, arguing that platform transformation occurs as a result of changes in the industrial environment and that companies will implement platform transformation in response to changes in the external competitive environment. However, the occurrence of platform transformation is not entirely determined by external environmental factors, and enterprises have the initiative of strategic change. Scholars have included organizational factors in the platform transformation model, reflecting the initiative of enterprises, and the strength of technology construction, organizational change capability, level of technology investment, and business relevance will all have a positive impact on platform transformation. Peng S Y.(2017) argues that internal and external factors of the organization will jointly influence the platform market, which in turn reacts to the internal and external factors of the organization through the platform market, forming a virtuous circle between the market and the organization. Jiang J H.(2017) argue that the organizational environment, resource capabilities, and organizational change have a significant impact on platform transformation, emphasizing that platform transformation is the result of a combination of factors, and later incorporates digital technology innovation. Therefore, scholars agree that platform transformation is not the result of a single factor and exploring the synergistic influence of

environmental and organizational factors has become an important research perspective in the study of the drivers of platform transformation. Table 1 provides a summary of the factors influencing platform transformation.

Factors / Author	Level of digitization	Managerial cognitive skills	Organizational culture	Environmental uncertainty	Funding	Organizational change capability	Government Support	Talent	Resource allocation capacity
Helmond A.(2015)	√			√			√		
Liu Q Z.(2016)	√	√	√			√			
Yan Y.(2016)	√	√			√				√
Jiang J H.(2017)	√	√		√		√			√
Han M Y.(2017)	√					√			
Bao Y Z.(2017)	√					√			
Benlian A.(2018)	√	√				√			
Fan X.J.(2018)	√					√			
Jia Peirui.(2019)				√					
Wang S .(2019)	√	√			√			√	
Xu Q R.(2019)	√					√			√
Dal Zotto C.（2020）		√	√			√			√
Zuo M Z.（2020）	√								
Piao Q X.（2020）	√	√		√			√		
Dai N.（2020）	√			√		√	√		√
Tang Z Y.（2020）	√								√
Guo Q.（2021）							√	√	√
Factor identification	0.88	0.41	0.12	0.29	0.12	0.53	0.24	0.12	0.41

Table 1. Factors influencing platform transformation

In Table 1, the level of digitalization has a high influence on platform transformation, while the cognitive ability and resource allocation ability of managers are at a medium level, environmental uncertainty and government support are at a slightly lower level, and organizational culture, capital, and talent are at a low level. As a kind of strategic change, platform transformation inevitably involves many internal and external factors of the enterprise. The internal conditions of an organization are the necessary factors for strategic change and are the key to gaining sustainable competitive advantage. Therefore, based on the above literature analysis and the agreement level of the factors influencing platform-based transformation in Table 1, this study selected factors with an agreement level of 0.24 and above and divided them into organizational and environmental factors to be included in the group analysis. And combined with Dai N.（2020）'s the classification of the platform transformation environment, i.e., the environmental dimension consists of two elements: environmental uncertainty and government support. Drawing on and integrating the work of Jiang J H.（2017）and Piao Q X.(2020) , the organizational dimension of platform transformation is constituted by the four dimensions of digitalization level, resource allocation capability, organizational change capability, and managerial cognitive ability, i.e., the six elements of environment and organization dimensions are used to explore the multi-factor synergistic path of platform transformation effectiveness. Figure 1 shows the research model of this paper. The environmental dimension includes government support and environmental uncertainty, while the organizational dimension includes digitalization level, resource allocation capability, organizational change capability, and managerial cognitive capability.

(1) External environment level
1) Environmental uncertainty
Many scholars believe that the uncertainty of the market environment in which companies operate is an important driving force for platform-based transformation and important motivation for organizational change. The understanding of the market environment determines the direction of strategic change in a company. Uncertainty in the environment exposes organizations to more risks and provides development opportunities for companies to implement platform change. In particular, large enterprises

are more focused on business model re-engineering to pursue relative advantages in an uncertain environment.

2) Government support

Government support helps companies to access resources and reduce associated costs, such as technical support, customer traffic, scarce resources, and tax incentives and provides a more favorable external environment for companies to transform their platforms. Government support provides a favorable external environment for companies to transform into platforms. Government support mainly refers to a series of policies and laws and regulations introduced by the government to encourage enterprises to actively engage in platformisation, platform technology support, platform construction, technology, R&D, etc. To promote the development of enterprises, the government support refers to a series of policies and laws and regulations that encourage enterprises to actively engage in platformisation, platform technology support, platform construction, technology, R&D, etc., such as government subsidies, technical and financial support for relevant projects.

(2) Organizational level
1) Digital level

Digital technology, as a new factor of production, can promote heterogeneity, the effective integration of knowledge and resources, and drive organizations out of strategic inertia. The in-depth application of digital technology is conducive to enterprises to explore the potential innovative value of existing resources, promote technological upgrading and expand the new functions of products and services. The platform business model requires connecting the supply and demand sides, mobilizing the activity of all parties, stimulating the network effect, and analyzing and meeting the needs of all participants with the help of digital technology. The transformation of enterprises into platforms needs the support of digital technology, and the operation of platform business models also needs to rely on data technology, information technology, blockchain technology, artificial intelligence technology, etc. Therefore, the digitalization level of enterprises is the technical guarantee for their platform transformation.

2) Resource allocation capacity

The rational and efficient allocation of resources by a company means that it has strong industry influence, market, brand, and other channel advantages in its field of operation. Resources are the basis for sustaining strategic change. A company not only needs a lot of resources, but also needs to allocate them efficiently to ensure that they can flow within the organization as well as play their role effectively and open them up to internal or external parties to attract talent, companies, or organizations to achieve value co-creation. The resource-based view of the industry According to the industrial resource-based view, heterogeneous resources are the important source of a company's core competitive advantage in the industry, so the company must quickly form a large enterprise with industry influence in the industry, to truly play the role of an industrial organization leader in the entire market, brand, channel, and supply chain system. In the process of transformation to a platform, the company must further explore and integrate various resource elements and technical strengths into other new platforms, which will facilitate the company to further expand the scope of business boundaries and capital of the company's production and trading activities, and continuously consolidate existing resource advantages and cultivate new resource advantages.

3) Capacity for organizational change

Platforms are considered to be organizational forms carefully designed to enable innovation and expansion of corporate boundaries, and platforming is an organizational change from traditional hierarchies to decentralize and flatten companies . Organizational theory suggests that organizational change can help improve strategic sensitivity and flexibility and that the ability to change an organization determines to a certain extent whether it can respond quickly to changes in the external environment. The transition to a platform requires a new, more flexible organizational structure and the continuous

optimization of its governance structure in the process. The ability to change the organization is a prerequisite for the transformation of a company's platform.

4) Managerial cognitive skills

The cognitive ability of managers refers to whether the senior leaders have platform management experience, whether the enterprise has ever accessed the platform in certain links whether the senior managers have a considerable degree of knowledge and support for the platform-based transformation and risks. To carry out platform transformation, enterprises first need managers with platform transformation and platform business model thinking to develop transformation strategies and manage and operate in the transformation process, especially senior managers, managers' knowledge of platform transformation and the internal and external aspects of the enterprise has a key role in promoting platform transformation for traditional enterprises.The transformation means that companies need to face different challenges. While the platform business model brings market expansion and transformation dividends to traditional enterprises, it can also face risks and resistance, accompanied by short-term discomfort. In this context, managers must have a clear understanding of platform transformation and their situation and play the role of transformation facilitator.This is where managers must have a clear understanding of the platform transformation and their situation and take on the role of transformation driver. Both the higher echelon theory and leadership trait theory suggest that the effectiveness of strategic transformation and execution is directly influenced by the cognitive traits of individual managers.Yasemin, Y.K.(2013) argue that the stronger the cognitive ability of managers, the better the strategic decision-making and implementation.

Based on the above analysis, the following model is proposed in this paper, see Figure 1:
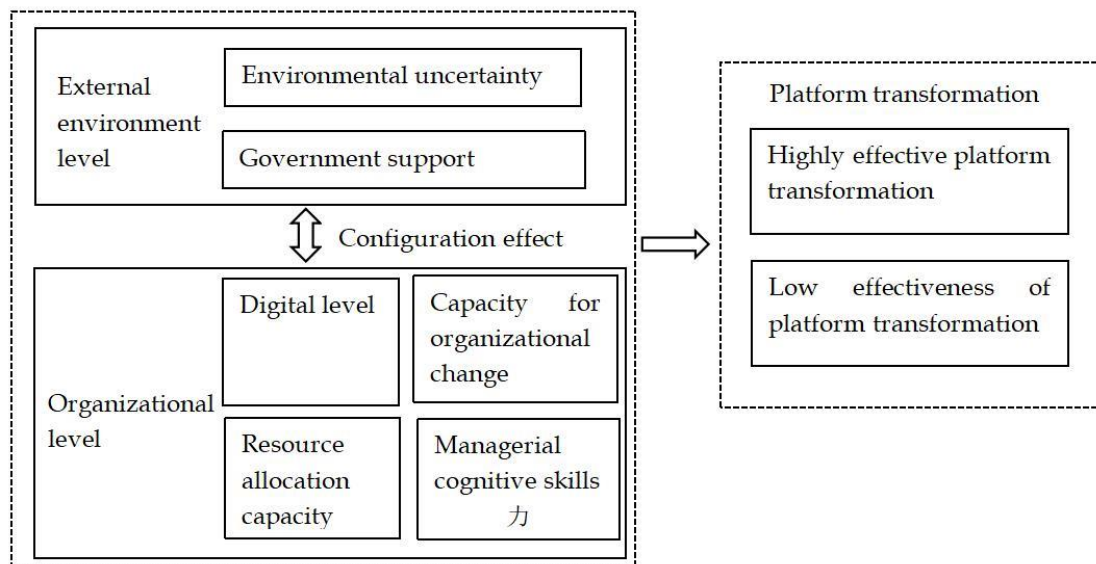

Figure 1. Research model

3. Study design
Research Methodology

This paper aims to explore the complex causal relationships between the drivers of platform-based transformation and the effectiveness of platform-based transformation, and therefore adopts the fsQCA research method, which focuses on multiple concurrent causal relationships across cases by analyzing the mechanisms of action between multiple conditions and outcomes, to explain the complex causal relationships involved. Its combination of qualitative and quantitative research can fill the gaps in existing studies and fully explore the conditional pathways that influence the effectiveness of platform-based transformation.

3.2 Data collection

In line with the research objectives of this paper and following the case selection principles of fsQCA for small and medium-sized samples, this paper allows for differences in the size of enterprises and industries in the selection of cases, but to better reveal the reasons for the differences in the effectiveness of platform transformation among different enterprises and to explore the paths of platform transformation, the following considerations were also taken into account: firstly, 30 listed enterprises with a high degree of active platform transformation in China were selected as the sample for this study. On the one hand, it can fully explore the platform-driven path of platform transformation, and on the other hand, it can overcome to a certain extent the differences in performance brought about by the differences in the active degree of platform transformation among different enterprises; secondly, this paper highlights the differences in the effectiveness of platform transformation among enterprises in the selection of cases, which can reveal the reasons for the differences in the effectiveness of platform transformation among enterprises. The reasons for this are the primary data for the conditional and outcome variables are mainly sourced from the annual reports of listed companies.

3.3 Measurement and calibration of variables
3.3.1 Measurement of variables

(1) Government support (PS). Regarding the measurement of government support, scholars currently measure government support for an enterprise's activities by interpreting and analyzing keywords in annual reports and relevant policy documents, through government project subsidy funds, or questionnaires. However, platform transformation is a complex process involving multiple factors, and the direct support of relevant policies and laws, and regulations for platform transformation is not yet clear. Drawing on previous measures of government support, and taking into account the purpose of this paper, government support is expressed in terms of the ratio of government grant funds to the net assets of the enterprise.

(2) Environmental Uncertainty (EU). Drawing on Gjosh D.(2009) and Shen H H.(2012) , the measure of environmental uncertainty is expressed as the standard deviation of a firm's abnormal growth in sales revenue over the past three years, adjusted for the industry. The median environmental uncertainty was calculated for each year and the variable was given a value of 1 for firms with environmental uncertainty greater than the median and 0 otherwise.

(3) Level of digitization (DT). A textual analysis of the annual reports of listed companies is a good measure of the importance that companies attach to a particular strategy. The more frequently a certain keyword appears in the annual report, the more effort and resources the company has put into this area. Therefore, in the absence of other more effective quantitative analysis indicators, textual analysis statistics and word frequency analysis statistics of annual reports of listed companies in China would be another realistic way to objectively portray the digital level of enterprises. This paper mainly draws on Chen Q J.(2021) .This paper uses Python2.0 to identify 20 keywords reflecting the digital level of enterprises, including informatization, networking, digitalization, intelligence, wisdom, information technology, digital technology, internet, internet of things, cloud computing, big data, artificial intelligence, digital resources, digital assets, e-commerce, virtual community, smart manufacturing, intelligent manufacturing, digital platform, and digital transformation. The text analysis was conducted on the keywords reflecting the digital level of enterprises, and the word frequency of the above 20 keywords in the annual report was used as a proxy indicator to measure the level of digital technology application of enterprises.

(4) Resource Allocation Capability (RAC). Enterprise resource allocation measurement is conducted using multiple dimensions, and enterprise resource allocation is expressed as the allocation pattern of the relevant resources of the enterprise in each dimension. This paper draws on Li C. G.(2014): (1) marketing investment: (sales cost/operating revenue): reflects the enterprise's resource allocation in product marketing and marketing; 2) R&D investment: (net intangible assets/operating revenue): reflects the enterprise's resource allocation in innovation; 3) capital intensity: (fixed assets/employee (number of employees): reflects the enterprise's capital and technology allocation strategy; 4) Overhead investment: (overhead/operating revenue): reflects the enterprise's resource allocation in operation and management;

the average of these four indicators is used as an indicator to measure the enterprise's resource allocation capability.

(5) Capacity for organizational change (SF) The ratio of intangible assets reflects a firm's ability to change and reconfigure, combined with Sheng Y. H.(2018) 's approach, the ratio of intangible assets to shareholders' net assets was used to measure organizational change capability.

Managerial cognitive ability (CA). Managerial cognitive ability includes the cognition of the external environment as well as the cognition of internal management. In terms of managers' cognition of the external environment, refer to Deng S J.(2010) . In terms of managers' cognitive ability, the frequency of words related to managers' cognitive ability was counted concerning Deng Shaojun's measurement of managers' cognitive ability. In terms of managers' perceptions, selected words that reflect the importance that managers attach to platform transformation and company development, such as platform strategy, platform transformation, platform development, mission, vision, values, organization, talent, performance, policy, system, strategy, tactics, competition, incentives, compensation, cost differentiation, and risk. To exclude the effect of word count differences on the results, the total word frequency of management perceptions was divided by the total number of words in the annual report (in thousands of words) and normalized to obtain a measure of managers' perceptions.

(6) Platform Transformation Effectiveness (PTR). The ultimate goal of platform transformation is to improve enterprise performance, so financial indicators are used to measure the effectiveness of platform transformation of enterprises. It is reflected by the growth rate of operating revenue. Firstly, operating income is the most widely used in growth studies. Secondly, the operating income growth indicator is the only growth indicator available for the case companies in this study and this data is easily accessible. Finally, the other indicators have some obvious drawbacks that limit their applicability in very specific situations. For example, indicators such as market share can only be compared within an industry of companies with similar product ranges.

3.3.2 Data calibration

In this study, the data for the six antecedent variables and one outcome variable were calibrated using a direct calibration method. Firstly, for environmental uncertainty, it was converted to a dummy variable and the median industry uncertainty was calculated, taking the value of 1 for firms with environmental uncertainty greater than the median and 0 otherwise. secondly, the remaining six variables were calibrated using three calibration points, namely fully affiliated (75%), crossover (50%) and fully unaffiliated (25%). Table 2 shows the settings and calibration of each variable.

Variable name	Calibration			Descriptive analysis			
	Fully in	Crossover	Fully out	Average value	Standard deviation	Minimum value	Maximum value
PTR	-0.645	8.155	16.58	8.78	13.84	-21.28	37.48
PS	0.0057	0.0109	0.0164	0.0109	0.0063	0.00	0.02
EU	0	0.5	1	0.4	0.50	0	1
DL	25.60	70.50	98.15	67.98	36.49	11.7	132.7
RAC	0.08	0.105	0.13	0.11	0.045	0.03	0.21
OOC	0.06	0.095	0.13	0.096	0.048	0.01	0.23
MAC	0.004	0.006	0.0083	0.006	0.003	0	0.01

Table 2. Data calibration and descriptive statistics

4. Data analysis and empirical results
4.1 Single condition necessity analysis

The level of consistency is usually used to reflect the degree of necessity of each factor for the same outcome to occur, drawing on Du Y, Z.(2017). The consistency threshold was set at 0.9. fsQCA3.0 software was used to analyze the necessity of individual conditions for the high and low effectiveness of platform transformation, and Table 3 shows the necessity of individual conditions. The results show that for both high and low platform transformation effectiveness, the level of agreement for each variable does not

exceed 0.9, so neither should directly constitute a necessary condition. This means that a single driving factor does not constitute a necessary condition for the effectiveness of platform transformation. Based on the theoretical perspective of strategy and transformation, the process of generating high effectiveness of platform transformation is also systematic and highly complex, and the synergistic impact of multiple complex factors such as government support, environmental uncertainty, digitalization levels, and differences in resource allocation capabilities must be further analyzed in depth.

Conditional variables	Resulting variables	
	Highly effective platform transformation	Low effectiveness of platform-based transformation
PS	0.84	0.32
~PS	0.30	0.81
EU	0.55	0.33
~EU	0.51	0.73
DL	0.88	0.36
~DL	0.30	0.82
RAC	0.61	0.43
~RAC	0.46	0.65
OOC	0.61	0.45
~OCC	0.46	0.63
MCA	0.78	0.35
~MCA	0.33	0.75

Table 3. Necessity tests for individual conditions of the fsQCA method

4.2 Analysis of configuration results
4.2.1 Generating highly productive configurations for platform-based transformation

In this paper, six antecedent variables and one outcome variable were included in the model for group analysis, and the consistency was set to 0.8, the frequency was set to 1 and the PRI was set to 0.7. The results of the fsQCA analysis are shown in Table 4, which shows that the overall consistency of the group was 0.979, higher than 0.8, and the overall coverage was 0.614, higher than 0.5, indicating that the group results have a better explanation for the high effectiveness of platform-based transformation good explanatory strength. The results show that there are four groupings (H1a, H1b, H2, and H3) that generate high effectiveness of enterprise platform transformation, and because the core conditions of H1a and H1b are the same, they are combined into one path, so there are three paths of high effectiveness of platform transformation. the coverage of the four groupings of high effectiveness of platform transformation are 0.39, 0.15, 0.23, and 0.07 respectively, indicating that the H1a path is effective in the greatest effect on enhancing the effectiveness of platform transformation in enterprises, H1b, and H2 have little difference in their effect on the effectiveness of platform transformation, and H3 has a relatively small impact on the effect of achieving high effectiveness of platform transformation. The following is a detailed analysis of each of the paths that affect the high effectiveness of platform transformation.

Conditions	Highly effective platform transformation				Low effectiveness of platform-based transformation			
	H1a	H1b	H2	H3	L1a	L1b	L2	L3
PS	●		●	●	⊗	⊗		⊗
EU	●	●	⊗	●	⊗		⊗	
DL	●	●	●	⊗	⊗	⊗	●	⊗
MCA	●	●		⊗	⊗	⊗	⊗	●
OCC		⊗	●	●		⊗	⊗	●
RAC		⊗	●	●	⊗	●	⊗	●
Consistency	0.99	0.95	0.99	0.94	0.98	0.94	0.96	0.95
Original coverage	0.39	0.15	0.23	0.07	0.31	0.20	0.20	0.14
Unique coverage	0.24	0.02	0.17	0.03	0.18	0.10	0.10	0.10
Overall consistency	0.979				0.973			
Overall coverage	0.614				0.652			

Table 4. High and low effectiveness configurations for platform transformation in fsQCA

(1) H1: Digitalisation level + managerial cognitive competence-driven path. H1a and H1b play a central role in the digitalization level (DL) and managerial cognitive competence (OCC), with environmental uncertainty (EU) and government support (PS) as supporting elements. This indicates that the level of digitalization and managerial awareness within the company plays a key role in this path, for example, Haier, Midea, and SAIC are representative of this path. Companies under this path are generally characterized by large corporate scale, large capital volume, and business diversification. Compared with H1a, under the H1b path, under the condition that the enterprises' organizational changeability and resource allocation ability are not high, enterprises with high digitalization level and high managerial cognitive ability can also enhance the effectiveness of platform-based transformation of enterprises, but it is worth noting that the original coverage rate of H1b is only 0.15, which is much lower than 0.39 of H1a, which indicates that the enterprises' organizational changeability and resource allocation ability in enhancing platform-based transformation effectiveness also plays a role.

(2) H2: Digitalisation level + Resource Allocation Capability (RAC) driven path. The core elements of this path are the digitalization level (DL) and resource allocation capability (RAC) of the company, with government support (PS) and organizational change capability (RAC) as supporting elements. This indicates that the level of digitalization and organizational change capability within the company play a key role in facilitating this type of pathways, such as Sany and Platform Group. The low uncertainty of the environment in which such companies operate provides more favorable environmental conditions for them to undertake platform transformation. A high level of digitalization and high organizational configuration capabilities, complemented by high government support and high organizational change capabilities can enhance the effectiveness of a company's platform transformation when the dynamics of the business environment are low.

(3) H3: Government support + resource allocation capability-driven path. The core elements of this path are government support (PS) and resource allocation capability (RAC), with managerial cognitive ability (MCA) as the core missing element and environmental uncertainty (EU) and organizational change capability (OCC) as supporting elements. This suggests that government support external to the firm and resource allocation capability within the firm play a key role in this type of pathway, even if the lack of managerial cognitive ability and high environmental dynamics do not affect the effectiveness of platform-

based transformation. This may imply that, when environmental uncertainty is high, the government provides financial support for the strategic development of certain firms to facilitate their survival and growth, which for certain firms can alleviate the tensions in the execution of their strategies or transformation and provide a better external environment for the firm. Internally, companies allocate resources rationally and efficiently and make organizational changes that facilitate the effectiveness of their platform-based transformation. However, the relatively small number of companies represented in this path indicates that the implementation of this path is risky and adaptive, and there may be critical factors that have not been considered.

4.2.2 Generating platform-based transformational ineffective configurations

In this paper, we also test the groupings that produce low effectiveness in platform transformation. Four groupings produce low effectiveness of platform transformation, and since the core conditions of L1a and L1b are the same and are combined into one path, there are three paths to achieve low effectiveness of platform transformation. Firstly, the groupings L1a and L1b show that even if a company has a certain level of resource allocation capability, the lack of high government support, high levels of digitalization, and high managerial awareness will not result in a high level of effectiveness of the company's platform transformation. Secondly, Histogram L2 shows that in an ecology lacking high managerial awareness and high organizational change capabilities, even with very low environmental uncertainty and a certain level of digitalization, the effectiveness of the enterprise's platform transformation will not be high. Finally, Histogram L3 shows that even with high organizational change capabilities and some managerial awareness and resource allocation capabilities, the lack of government support and low levels of digitalization result in low effectiveness of platform transformation.

4.3 Robustness tests

To test the stability and reliability of the conclusions, this paper increases the frequency threshold from 1 to 2 and the PRI consistency threshold from 0.7 to 0. 75, with other treatments unchanged, and conducts robustness tests on the antecedent histories with high platforming transformation effectiveness. It is found that the new model produces the same number of histories with the same core conditions and slightly different edge conditions, and the new histories produced are consistent with the original histories, indicating that the findings of this study are more robust.

5. Research findings and insights
5.1 Discussion

The research on platform transformation is in the ascendant. Many scholars have analyzed the reasons for the emergence of platform organizations from the perspective of the external environment. Dai N. (2020) believes that policy support and environmental uncertainty are important factors in the external environment. The research conclusions of this paper further verify the role of policy support and environmental uncertainty. In addition, this study found that digital level, organizational change ability, resource allocation ability and managers' cognitive ability are all internal organizational factors that affect the effectiveness of platform transformation, which is the same as the conclusion of Jiang J H (2017)'s research . Therefore, this paper verifies the previous research conclusions related to organizational platform, that is, internal and external factors of an organization jointly affect the effectiveness of organizational platform transformation. Different from many studies, this paper has found the path that multiple factors jointly drive the platform transformation, and the research has proved that there are multiple paths to improve the platform transformation effect. This result explains the differences in platform transformation paths caused by the differences in resources and environments among enterprises. Based on the internal and external perspectives of the organization, this paper comprehensively considers the previous research on the driving factors of the platform based on the external perspective or the internal perspective, providing a more complete theoretical analysis framework for explaining the causes of the platform-based transformation of the organization.

5.2 Conclusions

How to optimize organizational and environmental conditions for the effectiveness of transformation is the focus of research on strategic transformation. In a transition economy, multiple factors coexist, and both organizational and environmental factors have a significant impact on the transformation of a company's platform. This paper explores the synergistic impact of multiple factors on the effectiveness of platform transformation from an integrated environmental and organizational perspective, using the fsQCA research methodology. Firstly, the paper finds that individual factors do not constitute the necessary factors to influence the effectiveness of platform transformation. Secondly, this paper identifies 3 ways to promote the high effectiveness of platform-based transformation. These three reflect the multiple ways in which different companies can achieve high effectiveness in platform transformation. This suggests that senior managers can compare the 3 paths to achieve high effectiveness of platform transformation according to the current situation of their organizations and environments, match the technical and capability conditions and optimize the transformation drivers in the direction of digital level + managers' cognitive ability, digital level + resource allocation capability, government support + resource allocation capability driving paths to those companies with similar platform transformation groupings. achieve a high level of platform-based transformation activation, or they can carry out radical reforms to transform to a less similar platform-based transformation ecological context and enhance the effectiveness of platform-based transformation. Again, the three groups of high platform transformation performance in this study all include high levels of digitalization, reflecting that in the new economy, the level of digitalization plays an important role in enhancing the effectiveness of a company's platform transformation.

5.3 Management Insights

Based on the study of the relationship between enterprise environment and organization-level histories and the effectiveness of platform-based transformation, this paper inspires different enterprises to enhance their capabilities and focus on the optimization of certain elements of the combination of organization and environment levels to improve the effectiveness of platform-based transformation according to the conditions of the organization itself and the environment it is in. The practical implications of the results of this paper's history:

(1) In the context of the platform economy, improving the digitalization level of enterprises and leveraging organizational change capabilities are important measures to build a good platform transformation context and improve the effectiveness of platform transformation. h1a and h1b also show that when environmental uncertainty is high, enterprises can effectively improve the effectiveness of platform transformation through a benign coupling of high digitalization level and high managerial cognitive capabilities, etc. . Moreover, the largest number of companies belong to this grouping, indicating that the process of platform transformation should focus on improving the digital level and managerial cognitive ability of companies, such as big data, smart manufacturing, artificial intelligence and digital technologies required for platform transformation such as blockchain. As platform transformation is a high-risk and high-cognitive activity, it is important to enhance the cognitive ability of the company's managers to adequately identify and cope with operational risks and environmental uncertainties.

(2) In H2, the level of digitalization is benignly coupled with the ability to allocate resources as a core condition, while government support and organizational change capabilities act as supporting factors to facilitate the effectiveness of a firm's platform-based transformation. In the process of enhancing digitalization, enterprises are also required to strengthen their resource allocation capabilities, allocate resources well, and make the application and flow of resources efficient to support and cooperate with their platform transformation. Government support also has a positive impact on the effectiveness of platform transformation, so the government needs to provide some support to the strategic transformation of enterprises, which is conducive to providing a favorable external environment for enterprises to carry out platform transformation. In addition, enterprises need to enhance their organizational change capabilities to cope with environmental uncertainties, such as establishing learning organizations, developing their self-learning capabilities, continuously innovating and learning in the

process of organizational development, promoting a flat organizational structure, and establishing a culture of change.

(3) H3 shows a two-wheel-drive of government support + resource allocation capability, where high government support and resource allocation capability can produce high platform-based transformation effectiveness under high environmental uncertainty. The low raw coverage of this histogram indicates that individual companies are facing environmental dynamics that have been more successful in improving the effectiveness of platform-based transformation with the help of government support and the company's ability to allocate its resources appropriately. The implication of histogram H3 is that improving resource allocation capabilities and leveraging the incentives of environmental uncertainty in a favorable external environment created by high government support may be beneficial to the platforming transformation activities of enterprises.

5.4 Research limitations and research outlook

This paper has the following limitations: firstly, due to the limited availability of objective data, only 30 listed companies with a high level of activity in platform transformation were selected as the sample for this paper, which to a certain extent limits the generalisability of the findings, and more sample data can be collected in the future to further analyze the groups that produce high effectiveness of platform transformation. Furthermore, this paper has summarised six antecedent variables through literature reading and combing, but there is no convincing measurement of government support variables yet. In the future, we will continue to explore the government support factors that influence the effectiveness of platform transformation, and further improve the analysis of the groups of factors that influence the effectiveness of platform transformation. Finally, this paper focuses on the analysis of the effectiveness of platform transformation in the internal and external environment of the enterprises themselves. In the future, we may explore how the platform ecology in which the enterprises are located affects the effectiveness of platform transformation from the perspective of ecological theory.

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