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How Organizational Agility Promotes Digital Transformation: An Empirical Study

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Abstract: With the development of digital technologies and their increasing application in government, digital transformation is a wave rolling up the world. Previous studies had investigated some factors that affect digital transformation. But there is little research on the impact of organizational agility on digital transformation in government. To fill this gap, based on the dynamic capabilities view, this study aims to investigate how organizational agility affects digital transformation and dynamic capabilities as antecedents and factors impacting organizational agility. A survey study was conducted to empirically test the model. The data were collected from 313 government employees in government departments. The findings suggest that (1) organizational agility significantly influences digital transformation and (2) dynamic capabilities are important predictors of organizational agility.

Keywords: digital transformation performance; organizational agility; dynamic capability; operational adjustment agility; strategic agility

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1. Introduction

With the development of digital technologies and their increasing application in government, digital transformation is turning the tide in the world. COVID-19 accelerated the process of digital transformation [1,2]. Thus, in a VUCA environment, digital transformation is "not an option but a necessity for governments to respond to crises" [3,4] and citizens' expectations [5,6]. Digital transformation has increasingly received attention from scholars and practitioners in the field of public administration.

Previous studies had investigated some factors that affect digital transformation [3,7–10]. But there is little research on organizational agility influencing digital transformation in government. While organizational agility plays an important role in digital transformation in a VUCA environment [11]. Moreover, in order to promote digital transformation, governments need to build dynamic capabilities [12,13]. Dynamic capabilities are the basis of organizational agility, which could respond to digital transformations [14]. But there is little research on dynamic capabilities affecting organizational agility in the topic of government digital transformation. Furthermore, previous studies have mainly relied on qualitative research; empirical studies are rare [9].

Thus, the main research questions of interest to this study were as follows: (1) What are the impacts of organizational agility on local governments' digital transformation in China? (2) What are the degrees of influence of dynamic capabilities on organizational agility in digital transformation? To address these questions, the dynamic capabilities view is drawn upon to propose a model of digital transformation in government organizations in China.

The rest of the paper proceeds as follows. The second section reviews the literature in relevant fields. Theoretical analysis and research hypotheses are presented in Section 3. The fourth section describes the research methods used in this study. The results of the data analysis are presented in Section 5. The final section presents the findings and research implications of this study.

2. Literature Review

Digital transformation is a hot topic in the field of public administration. According to the framework of [5], the studies on government digital transformation could be divided into three categories: reasons, process, and results.

The reasons for government digital transformation around the world include (1) Environmental aspects. Digital transformation is an effective tool for the government's VUCA environment to overcome multiple threats and social conflicts [3,4,15]. COVID-19 was an accelerator of digital transformation [1,2] by changing the attitudes of public managers and government employees toward digital transformation [16,17]. (2) Technology change. Technology advances play a key role in governments' transformation [5,7,10]. With the application of digital technology in government, it has changed the government's operations [18], structures [19], and public services [20]. (3) Organizational aspects. The government faced tightening fiscal difficulties [21,22] and cost reductions [5,23]. Thus, governments should increase their efficiency by using digital technology to change circumstances [24,25]. (4) People aspects: citizens expect to interact digitally with the government because of technical advancement and social evolution [2,5,6,16].

The digital transformation process includes: (1) digitizing relationships. Digital technology application in government has been promoting better collaborative partnerships between governments and citizens [25,26], the private sector [15], and stakeholders [27]. (2) Digitize the service. The government uses digital technology to digitize services for citizens, such as digital museums [1], digital healthcare services [28], and virtual courts [20]. (3) Using new technology. Digital transformation in government occurs through implementing or using such technologies as AI [29–31], big data [32–34], IoT [35,36], cloud computing [37], and blockchain [38,39].

The outcomes that appeared in studies included improved services, better relationships, and improved policies. (1) Improved services. The application of digital technology in government has improved some services, such as user-centric service improvement [21], an open platform for government service delivery [40], and speedy trials in the judiciary [41]. (2) Better relationships. The application of digital technology in government sectors has promoted better communication between citizens and the government [42]. Thus, promoting citizen participation [43] and enhancing citizens' trust in government [44]. (3) Improved policies. The application of digital technology has influenced the public policy cycle [30,44], such as public policy analysis [45,46], policy-making [32,34,47], and policy decision-making [48]. With the references above, this study will mainly study the importance of organizational agility in government digital transformation.

3. Theoretical Analysis and Research Hypothesis

3.1. Theoretical Analysis Framework

The dynamic capabilities view is a further extension and development of the resource-based view [49–51]. Dynamic capabilities refer to "the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments" [50]. Thus, dynamic capabilities focus on changing the organization's resources and competencies to respond to turbulent environments and achieve sustainable competitive advantage [50,51].

Dynamic capabilities consist of three capabilities: sensing capability, seizing capability, and reconfiguring capability [51]. (1) Sensing capability is the ability of organizations to sense opportunities and threats, which involves "scanning, creating, learning, and interpreting activities" [51]. (2) Seizing capability could be understood as an organization's ability to seize opportunities or respond to threats, which are "addressed through new products, processes, or services" [51]. (3) Reconfiguring capability, also known as transforming capability, is the "continuous alignment and realignment of specific tangible and intangible assets" [51].

Although the dynamic capability view originates from business management, it was also applied to the field of public administration [9,52–54]. There are many issues using the dynamic capability view as a theoretical lens, such as smart cities [55,56], emergency management [12,57], and public policy [58,59]. While the studies using dynamic capabilities

in public administration are still limited [9,12,53,54], scholars should pay more attention to dynamic capabilities in public change management [12,60].

As for issues of digital transformation in government, the dynamic capabilities view is a guidance lens for the digital transformation process in public service organizations [61]. Dynamic capabilities help the government transform from one stage to the next [62]. Dynamic capabilities could prompt digital transformation through real-time sensing and response [35]. Dynamic capabilities also play an important role in improving the ability of platform leaders to create and capture value [63] and design and facilitate digital services [61]. Thus, the dynamic capability view as a theoretical foundation is suited for this research. Meanwhile, this research expands and deepens the application of dynamic capabilities in digital transformation in government.

Based on the dynamic capability view, the research model shown in Figure 1 was developed. The model suggests that organizational agility affects digital transformation performance and dynamic capabilities as antecedents and factors affecting organizational agility. Then, the analysis framework will be explained further.

Figure 1. Diagram of analysis framework.

3.2. Research Model and Research Hypothesis

Based on the dynamic capabilities view, the research model shown in Figure 2 was developed. The model suggests that organizational agility affects digital transformation performance and dynamic capabilities as antecedents and factors impacting organizational agility.

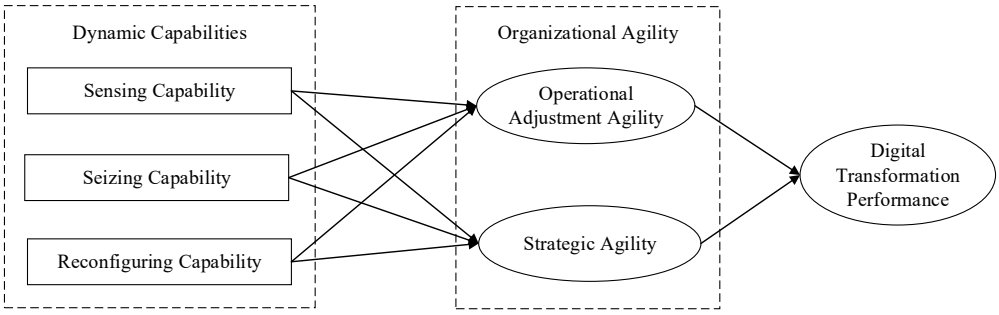

Figure 2. The research model.

(1) Dynamic capabilities and organizational agility

The rapid and unpredictable changes in the environment [54,64] create significant challenges for governments [12,65,66]. Thus, governments need highly dynamic capabilities to respond to these challenges and adapt to turbulence [9,52,53,67,68]. But dynamic capabilities are often missing in government sectors [12,58,69]. Dynamic capabilities are a precondition for government digital transformation [70]. Thus, the government needs to build dynamic capabilities for digital transformation [12,13].

Organizational agility is "a firm's ability to cope with rapid, relentless, and uncertain changes and thrive in a competitive environment of continually and unpredictably changing opportunities" [71]. There are many antecedents and factors that affect organizational agility [72–74]. Dynamic capabilities play an important role in shaping organizational agility [71,75–77]. Dynamic capabilities are "necessary for fostering organizational agility to address deep uncertainty" [77]. Thus, dynamic capabilities are key predictors of organizational agility [71,76]. Previous conceptual and empirical research studies show that dynamic capabilities and their composition have positive effects on organizational agility and its dimensions [75–80].

Organizational agility in this study consists of operational adjustment agility and strategic agility. The reason is that organizational agility requires organizations to develop operational and strategic flexibility [81,82]. Previous studies have empirically shown that dynamic capabilities have a positive effect on operational adjustment agility [75,80,83] and strategic agility [84,85]. These lead to the second hypothesis:

H1. *Dynamic capabilities have a positive impact on organizational agility.*

H1a. *Sensing capability has a positive impact on operational adjustment agility.*

H1b. *Seizing capability has a positive impact on operational adjustment agility.*

H1c. *Reconfiguring capability has a positive impact on operational adjustment agility.*

H1d. *Sensing capability has a positive impact on strategic agility.*

H1e. *Seizing capability has a positive impact on strategic agility.*

H1f. *Reconfiguring capability has a positive impact on strategic agility.*

(2) Organizational agility and digital transformation performance

Organizational agility has been proven to have a positive impact on organizational performance in the field of business management [11,86]. Organizational agility becomes an important determinant of governmental performance in changing environments [87,88]. Moreover, organizational agility plays an important role in digital transformation. Lack of organizational agility is one of the top barriers to government digital transformation [89]. Some studies have found the impact of organizational agility on digital government transformation [15,90,91]. Hence, the following hypothesis is formulated:

H2. *Organizational agility is significantly and positively related to digital transformation performance.*

H2a. *Operational adjustment agility is significantly and positively related to digital transformation performance.*

H2b. *Strategic agility is significantly and positively related to digital transformation performance.*

4. Materials and Methods

Variable Selection

The design of the questionnaire is based on the theoretical hypotheses of the research model. The survey contents include the hypothesis variables: (1) Sensing capability (SNC), involving three observation variables, respectively, is "our organization scan the environment and identify new opportunities (SNC1)"; "our organization reviews our service development efforts to ensure they are in line with what the citizens want (SNC2)"; "our organization implement ideas for new services and improve existing services (SNC3)" [80]. (2) Seizing capability (SIC), involving three observation variables. In addition, "our organization invests in finding solutions for our citizens (SIC1)" "our organization responds to defects pointed out by government employees (SIC2)" and "our organization changes our practices when citizen feedback gives us a reason to change (SIC3)" [92]. (3) Reconfiguring capability (RC), including three observation variables, "our organization can easily add an eligible new partner or remove ones (RC1)" "Our organization can adjust our business processes in response to shifts in our business priorities (RC2)" "Our organization can reconfigure our business processes in order to come up with new service assets (RC3)" [80]. (4) Operational adjustment agility (OAA), including "Our organization can better meet demands for rapid-response, special requests of our customers whenever such demands arise (OAA1)" "Our organization can quickly scale up or scale down our service levels to support fluctuations in demand from the citizens (OAA2)" "Whenever there is a disruption in supply our organization can quickly make necessary alternative arrangements and internal adjustments (OAA 3)" [71]. (5) Strategic agility (SA), including "If circumstances change, our organization can easily change its current plans (SA1)" "our organization is prepared to react in a modified and viable manner (SA2)" "our organization can control a shift

in strategy (SA3)" "our organization can pro-actively develop a new project (SA4)" [93]. (6) Digital transformation performance (DTP), including "our organization implement a digital platform-based business model (DTP1)" "our organization flexibly adjust the structure of functional departments (DTP2)" "our organization establish a decision making and control system based on data analysis (DTP3)" [94].4.2. Study Area and Data Source

Jiangsu Province is located in the Yangtze River Delta. The 2022 GNP of Jiangsu Province ranks second in China and belongs to the economically developed region. In 2023, Jiangsu will make a series of deployments to promote the construction of a digital government. Jiangsu Province is at the forefront of the country in terms of digital transformation. Therefore, we chose Jiangsu as the sample population. Figure 3 shows the geographical location of Jiangsu Province in China.

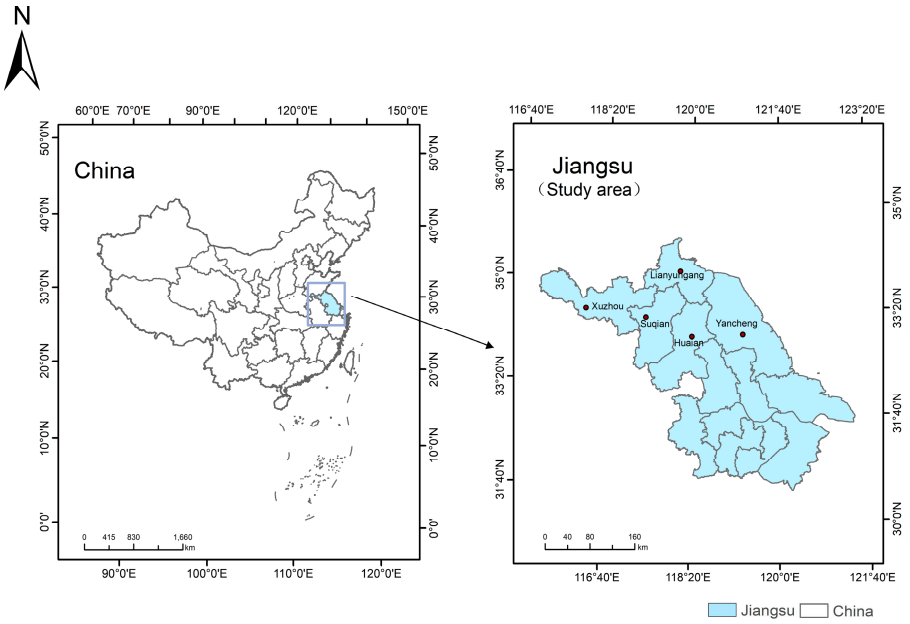

Figure 3. Location of Jiangsu Province in China.

The data used in the following empirical study is from public servants' survey data, and 313 valid questionnaires were collected randomly. The survey respondents are mainly public servants from municipal government departments in northern Jiangsu, such as Xuzhou, Lianyungang, Suqian, Huaian, and Yancheng. In each city, about 60 servants were selected. Then the effective data collection is sorted out to obtain the preliminary statistical information.

5. Results

5.1. Descriptive Statistics

The questionnaire was mainly released to government department staff through the Questionnaire Star platform, and a total of 387 questionnaires were collected. In order to ensure the quality of the sample, the questionnaire was screened by two indicators. Questionnaires that were taken in less than 40 s were deleted first. Then, questionnaires with the same answers were also regarded as invalid responses. After strict screening, 74 invalid questionnaires were excluded, and the remaining 313 valid questionnaires were found, with an effective rate of 81%. Among the 313 valid questionnaires, the statistical table of basic information for the samples is shown in Table 1. In terms of gender, males accounted for 46.0 percent and females accounted for 54.0 percent. The respondents aged 18–25, 26–30, 31–40, and 41 years old accounted for 28.1 percent, 45.0 percent, and 3.8 percent, respectively. When it comes to education level (including reading), high school and below accounted for 1.3 percent, college and undergraduate accounted for 74.1 percent, and postgraduate accounted for 24.6 percent. 77.3 percent were less than three years old, and 22.7 percent were more than three years old.

Table 1. Descriptive statistical analysis of samples.

Demographic Variable	Classification Item	Frequency	Percentage (%)	Cumulative Percentage (%)
Gender	Male	144	46.01	46.01
	Female	169	53.99	100
Age	18–25 years	88	28.12	28.12
	26–30 years	141	45.05	73.17
	31–40 years	72	23.00	96.17
	Over 41 years old	12	3.83	100
Education	High school and below	4	1.28	1.28
	College and undergraduate	232	74.12	75.40
	Postgraduate	77	24.60	100
Years of service	Less than three years	242	77.32	77.32
	Three years and above	71	22.68	100

5.2. Test of Validity and Reliability

To evaluate the adequacy of the measurement model, confirmatory factor analysis (CFA) was performed using the maximum likelihood approach. Validating a scale involves testing its reliability, convergent validity, and discriminant validity [95].

Construct reliability was commonly evaluated by Cronbach's alpha values. As summarized in Table 2, six constructs in the research model showed good reliability, with alphas exceeding 0.8, an acceptable threshold recommended by [96].

Table 2. Combined reliability and convergent validity of latent variables.

Variables	Loading	CR	AVE
SNC 1	0.794 ***	0.828	0.617
SNC 2	0.797 ***		
SNC 3	0.765 ***		
SIC 1	0.851 ***	0.843	0.642
SIC 2	0.782 ***		
SIC 3	0.769 ***		
RC 1	0.757 ***	0.807	0.582
RC 2	0.745 ***		
RC 3	0.787 ***		
OAA 1	0.845 ***	0.892	0.734
OAA 2	0.873 ***		
OAA 3	0.852 ***		
SA 1	0.852 ***	0.912	0.721
SA 2	0.866 ***		
SA 3	0.841 ***		
SA 4	0.836 ***		
DTP 1	0.815 ***	0.839	0.635
DTP 2	0.788 ***		
DTP 3	0.788 ***		

*** $p < 0.001$.

Convergent validity for the six research constructs was assessed using criteria suggested by [95]. As listed in Table 2, all factor loading values ranged between 0.745 and 0.873 and were significant at $p < 0.001$. Composite reliability for six constructs greater than 0.8. Therefore, the test of convergent validity was met.

Discriminant validity was assessed using the criteria suggested by [95]: The average variance extracted values (AVE) of six factors were above 0.5. As shown in Table 3, the AVEs were all higher than 0.5. Hence, the test of discriminant validity was met.

Table 3. AVE and correlation of latent variables.

Construct	AVE	Factor Correlation					
		SNC	SIC	RC	OAA	SA	DTP
SNC	0.617	0.785					
SIC	0.642	0.671	0.801				
RC	0.582	0.379	0.342	0.763			
OAA	0.721	0.395	0.391	0.333	0.849		
SA	0.734	0.407	0.412	0.290	0.481	0.857	
DTP	0.635	0.315	0.260	0.459	0.417	0.474	0.797

5.3. Model Test

The structure model was tested using structural equation modeling (SEM) as performed by AMOS 7. A set of common model-fit measures was used to assess the overall goodness-of-fit of the model. The results of measures summarized in Table 4 χ^2/df ($\chi^2 = 205.378$, df = 141) was 1.457 and less than 3; NFI, GFI, and CFI were all greater than 0.9; and RMSEA was 0.038 and less than 0.1. The result of model-fit met their respective common acceptance criteria, showing that all constructs have a very good fit.

Table 4. Overall model-fit indices for the research model.

Model-Fit Indices	χ^2/df	NFI	GFI	CFI	RMSEA
Recommended value	<3	>0.9	>0.9	>0.9	<0.1
Results	1.457	0.939	0.937	0.98	0.038

5.4. Hypothesis Testing

The hypotheses were tested collectively by examining the significance of the relationships in the SEM model. The standardized path coefficients and path significances of the research model are presented in Figure 4.

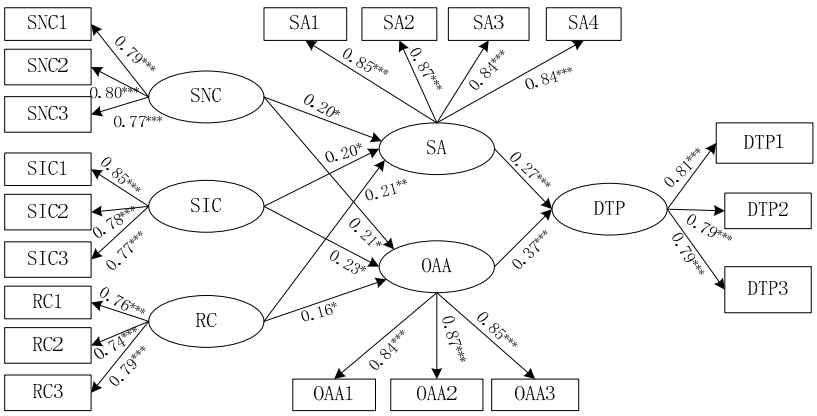

Figure 4. Structural equation model diagram of the research model. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

All the paths, as shown in Figure 4, were significant. Sensing (β = 0.211, ρ = 0.023 < 0.05), seizing (β = 0.227, ρ = 0.012 < 0.05), and reconfiguring (β = 0.160, ρ = 0.019 < 0.05), respectively, had a significant effect on operational adjustment agility. Sensing (β = 0.196, ρ = 0.033 < 0.05), seizing (β = 0.200, ρ = 0.025 < 0.05), and reconfiguring (β = 0.209, ρ = 0.002 < 0.01), respectively, had a significant effect on strategic agility. Operational adjustment agility (β = 0.371, ρ = 0.000 < 0.001) and strategic agility (β = 0.267, ρ = 0.000 < 0.001), respectively, had a significant effect on operational adjustment agility. Thus, all hypotheses in the research model were supported (see Table 5).

Table 5. Research hypothesis testing results.

Research Hypothesis	T-Value	*p*	β	R2
SNC—OAA	2.513	*	0.211	0.236
SIC—OAA	2.352	*	0.227	
RC—OAA	2.244	*	0.160	
SNC—SA	2.268	*	0.196	0.235
SIC—SA	3.090	*	0.200	
RC—SA	2.136	**	0.209	
OAA—DTP	5.821	***	0.371	0.255
SA—DTP	4.340	***	0.267	

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

6. Discussion and Implications

6.1. Discussion

Drawing upon the dynamic capabilities view, the study described organizational agility as affecting digital transformation performance and dynamic capabilities as antecedents and factors impacting organizational agility. The results suggest that organizational agility significantly influences digital transformation performance, and dynamic capability is an important antecedent and factor of organizational agility. Therefore, it could reasonably be concluded that organizational agility is an important antecedent of digital transformation performance in government agencies.

The results of the study indicate that dynamic capabilities are an important antecedent of organizational agility. The results are consistent with the findings of earlier empirical research in business management [75,79,80] and qualitative research in public administration [35]. This is because the government needs to build dynamic capabilities for digital transformation [12,13]. After the baptism of COVID-19, the government had partly built its dynamic capabilities. The dynamic capabilities could help governments sense and seize opportunities and reconfigure organizational resources for organizational agility [97]. According to the changing environment, the government can timely change its strategy and daily operations. Thus, the government can better respond to the VUCA environment and provide the services required by the public.

The study also found that organizational agility is an important determinant of digital transformation performance in government organizations. The results are consistent with the findings of previous empirical research in business management [11,83] and qualitative research in public administration [15,90,91]. The government senses change and responds quickly, so it can find solutions to cope with it. Thus, organizational agility can improve the efficiency of service delivery [87] and innovation [15] through digital technology. This is very helpful for governments' working with other organizations and departments in the digital transformation process.

6.2. Implications

(1) Implications for theory

Firstly, this study has widened and extended the topic of antecedents and factors impacting digital transformation. Although previous studies have investigated some factors having an effect on digital transformation, there is little research on organizational

agility. Moreover, the research methods mainly depend on qualitative methods, such as case studies. Thus, the study empirically investigates digital transformation and offers more insight into this phenomenon. This study represents an empirical investigation into the influencing factors of digital transformation on the basis of dynamic capabilities. The result of this study is a parsimonious model that explains how organizational agility influences digital transformation.

Secondly, a detailed exposition of the dynamic capabilities view is undertaken, and its application to digital transformation in government organizations in China is illustrated. This study applies this theory to digital transformation in government. Based on previous studies, this study shows how the dynamic capabilities view could be used to explain organizational agility. The selection of relevant observation indicators refers to existing literature practices, and in the future, the indicators may be screened and improved for different regions and departments to make them more targeted.

(2) Implications for practice

The findings of this study also have important practical implications for the digital transformation of government agencies. Firstly, an understanding of organizational agility impacting digital transformation will put practitioners in a better position to design suitable strategies and ordinary operations to respond to a VUCA environment through digital technology and, consequently, to provide required services to the public. Secondly, dynamic capabilities emerged as a crucial variable influencing organizational agility in the government context. In order to build micro-foundations of dynamic capabilities, the government must strengthen digital technology deployment, develop employee skills, and change government structures and procedures. These are the practical conclusions for China. For other countries, it may have a different effect, depending on culture, policy, and other factors. A comparative study of the situation in different countries could be carried out in the future.

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