

Slack Resources, Dynamic Capabilities, and Digital Transformation in Manufacturing Enterprises: Evidence from A-Share Listed Companies in China

Qiong Pan^{1, a}, Yu Zhang^{1, b}

¹College of Management, Xi Hua University, Chengdu, China

^ajune0148@168.com, ^b2244873450@qq.com

Abstract

As the resource “buffer pool” of manufacturing enterprises, how slack resources influence the digital transformation of manufacturing enterprises? Based on the data of the manufacturing industry in Shanghai and Shenzhen from 2011 to 2023, this paper empirically tests the impact of slack resources on the digital transformation of manufacturing enterprises and its transmission mechanism. It is found that both absorbed slack resources and unabsorbed slack resources positively promote the digital transformation of enterprises. Dynamic capabilities play a partly mediating role between slack resources and digital transformation. The Executives' digital background positively regulates the relationship between absorbed slack resources and the digital transformation of enterprises, while the moderating effect on the relationship between unabsorbed slack resources and digital transformation is not significant. The article further supplements the research on the antecedents and processes of digital transformation, enriching the study of the impact boundaries of managers on digital transformation.

Keywords

Digital transformation; Slack resources; Dynamic capabilities; Executives' digital background.

1. Introduction

As the “workshop of the world”, manufacturing plays an irreplaceable role in China's economic development. The digital transformation of manufacturing enterprises is a critical link in achieving sound economic growth in China. According to the *Report on the Development Index of Manufacturing Digital Transformation (2024)* released by the China Software Industry Association, the growth rate of China's manufacturing digital transformation index exceeded 40% between 2020 and 2023, demonstrating notable clustering effects in key regions and coastal cities such as Shanghai and Beijing. However, the digital transformation of manufacturing enterprises typically involves long cycles, high costs, and significant risks[1]. Many manufacturing firms remain at a relatively low level of digital transformation, primarily at the stage of adopting digital technologies, without advancing to deeper application or realizing tangible efficiency gains[2].

While early studies primarily focused on technological and environmental factors influencing digital transformation[3-4], recent research has increasingly turned attention to internal organizational factors[5-6]. Among these, enterprise resources are still regarded as the fundamental internal factor for corporate transformation and upgrading[7]. Compared with other industries, manufacturing enterprises tend to be larger in scale, have longer production cycles, and have more redundant resources. As we know, redundant resources can provide a buffer that helps enterprises respond swiftly to changes. However, how can static resources

contribute to digital transformation? The underlying mechanisms of this process remain to be further explored.

While slack resources in manufacturing enterprises provide greater buffer space and a foundation for resource linkage in digital transformation, firms need the capability to fully utilize and transform these resources in order to truly realize their enabling role in transformation. Dynamic capability refers to an enterprise's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments[8]. Existing research has revealed that those with stronger dynamic capabilities are better equipped to cope with the challenges of technological iteration[9]. Then, do slack resources in manufacturing enterprises influence their digital transformation by affecting dynamic capabilities? Furthermore, Is there a difference in the process mechanisms through which the two types of slack resources influence digital transformation? Exploring these questions provides an important breakthrough in revealing the mechanism through which slack resources affect the digital transformation of manufacturing enterprises.

Furthermore, there may be boundary conditions influencing the impact of manufacturing enterprises' slack resources on digital transformation, and these boundary conditions may also differ depending on the type of the resource redundancy. This study introduces executives' digital backgrounds as moderating variables. Existing research suggests that executives' personal backgrounds influence their cognition and values, thereby affecting the formulation and implementation of corporate strategy[10]. Executives with digital backgrounds can reduce managerial myopia and promote enterprise digital transformation [11].

In summary, this paper tend to examine the relationships among redundant resources, dynamic capabilities, and digital transformation. It aims to further complement research on the antecedents of digital transformation of manufacturing enterprises and enrich the understanding of the boundaries of managerial influence on its digital transformation. The findings provide a basis for managers to leverage redundant resources in a more dynamic environment.

2. Hypotheses Development

2.1. Slack Resources and Digital Transformation

Slack resources refer to the difference between the resources available to an organization and the resources currently deployed in its operations[12]. Based on the liquidity and flexibility of resource use, slack resources can be categorized into absorbed slack and unabsorbed slack. Absorbed slack includes dedicated production equipment, technology patents; Unabsorbed slack includes idle funds, short-term financial assets.

Given the industry characteristics of manufacturing enterprises, this paper draws primarily on the resource-based view to explore the positive role of manufacturing firms' slack resources in driving digital transformation[13]. Absorbed slack resources are highly specialized and closely tied to specific businesses or technologies. These resources can serve as a foundation for technological innovation in digital transformation. Firms can retrofit and upgrade existing specialized equipment to enable digital capabilities, or leverage technology patents to collaborate with external organizations in developing new digital technologies or products, thereby accelerating the transformation process. Digital transformation is a process that requires high investment and face considerable uncertainty,so that the process is unsustainable without sufficient resource support. Absorbed slack resources can protect the core organizational competitiveness when a firm encounters difficulties[14]. Moreover, while supporting innovation, absorbed slack resources can also help firms overcome resource rigidity, contributing to their sustainable development[15].

Unabsorbed slack resources are highly versatile, liquid, and flexibly deployable. These resources are applicable to a wide range of scenarios, easy to reallocate and realize in cash—such as idle funds and short-term financial assets. They offer inherent advantages for firms' non-routine investment activities[14] and can promote innovation and improve performance[16]. Managers in firms with higher levels of unabsorbed slack enjoy greater discretion[17], which allows them to respond more flexibly to unexpected situations, make decisions that better reflect the realities of their departments, increase employee buy-in, and improve the success rate of transformation. Based on the above, this paper proposes Hypothesis 1 and Hypothesis 2:

H1: Absorbed slack resources can promote corporate digital transformation.

H2: Unabsorbed slack resources can promote corporate digital transformation.

2.2. The Mediating Role of Dynamic Capabilities

A firm's original core capabilities may turn into a burden that hinders development in volatile environment[18]. Therefore, dynamic capability is needed that can adapt to environmental changes and promptly adjust and reconfigure resources to sustain the firm's core competitiveness. Teece et al[8] were the first to propose the concept, defining them as a firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments. Dynamic capabilities are divided into three dimensions: absorptive capacity, innovative capacity, and adaptive capacity. Firms with stronger dynamic capabilities are better able to cope with the challenges of technological iteration, identify and master valuable technologies, and integrate them into their existing systems. Therefore, dynamic capabilities are conducive to promoting corporate digital transformation[19].

To make strategic adjustments in intense competition, managers must rely on the support of slack resources to cultivate robust dynamic capabilities. Absorbed slack resources are embedded within the firm and can immediately respond to the firm's innovation activities[20]. Through their stability, they provide a strategic buffer, supporting long-term R&D investment and technological iteration, thereby enhancing the firm's adaptive capacity in core areas. For example, such resources can be transformed into innovative capacity through targeted R&D, enabling the firm to maintain a competitive advantage amid technological changes, thus forming the foundational support for dynamic adjustment.

Unabsorbed slack resources grant the firm greater flexibility and autonomy[21]. Their readily deployable nature allows the firm to respond swiftly to market fluctuations or technological disruptions, adjusting strategic directions through short-term resource reconfiguration, such as flexibly investing in emerging markets or trial innovation projects. This agility in opportunity identification and resource restructuring directly enhances the firm's dynamic capabilities. Furthermore, Lian et al[22] argue that unabsorbed slack resources enable managers to attempt more exploration in uncertain environments. When a firm faces sudden market volatility, or other risks, unabsorbed slack resources can act as a buffer. For instance, resources such as idle funds or inventory can help the firm maintain operations and avoid distress caused by cash flow interruptions or raw material shortages. Unabsorbed slack resources positively influence organizational resilience[23], empowering the firm to seek opportunities amidst crises. By rationally allocating these resources, the firm can adjust its business direction or undertake strategic transformation, thereby achieving development amidst risks and enhancing its dynamic capabilities. Based on the above, this paper proposes Hypotheses 3 and 4:

H3: Dynamic capabilities mediate the relationship between absorbed slack resources and digital transformation.

H4: Dynamic capabilities mediate the relationship between unabsorbed slack resources and digital transformation.

2.3. The Moderating Effect of Executives' Digital Backgrounds

The resource-based view emphasizes that how resources are used depend on management's judgment[24]. Faced with environmental uncertainty, most top management teams find it difficult to effectively implement digital transformation due to path dependency, lack of transformation experience or foresight[25,26]. This is particularly evident in traditional manufacturing industries. Existing research has examined the influence of managerial attention, risk preference, and other factors on corporate decision-making processes. Since managerial attention and risk preference are directly shaped by managers' personal backgrounds, this study introduces executives' digital background as a moderating variable to explore how it affects the relationship between slack resources and corporate digital transformation.

The effective utilization of absorbed slack resources often requires innovative thinking and methods to explore new business models. As market conditions change rapidly, firms need to adjust their strategies and resource allocation in a timely manner to adapt to new situations. CEOs with information technology knowledge can improve the firm's information environment [27], which helps the firm leverage absorbed slack resources to respond to market changes. Through technological insight, seemingly useless absorbed slack resources can be integrated into a new blueprint for the firm's digital innovation.

Unabsorbed slack resources offer greater flexibility and are generally easier for managers to mobilize. At the same time, research suggests that managers often exhibit strong path dependency in how they deploy resources [26]. This is especially true in the context of the digital economy, where a large number of young workers prefer to enter relatively emerging industries, resulting in managers in traditional manufacturing industries having fewer opportunities to directly absorb and engage with new technologies and knowledge during their work. This indirectly amplifies the influence of executives' past experiences on their digital behaviors. Consequently, the higher the proportion of executives with a digital background, the higher the probability that a firm will invest in digitalization. Based on the above, this paper proposes Hypotheses 5 and 6:

H5: Executives' digital background positively moderates the relationship between absorbed slack resources and corporate digital transformation.

H6: Executives' digital background positively moderates the relationship between unabsorbed slack resources and corporate digital transformation.

3. Research Method

3.1. Sample and Data Sources

This paper selects data from Chinese A-share manufacturing listed companies on the Shanghai and Shenzhen stock exchanges from 2011 to 2023 as the research sample. Firm-level financial data and basic company information are primarily sourced from the CSMAR database, while data related to digital transformation are obtained from textual analysis of listed companies' annual reports. To ensure the validity of the sample, observations with a trading status of ST or *ST during the year, as well as those with missing variable data, are excluded. Additionally, financial firms such as banks and insurance companies are removed from the sample. The remaining sample is winsorized at the 1% and 99% levels, resulting in a final sample of 9,760.

3.2. Variable Measurement

Digital Transformation (DT). This paper draws on the relevant studies of Wu et al.[28]. Based on a digital transformation dictionary constructed from existing textual analysis research, a Python web crawler is used to perform word frequency statistics on phrases related to "corporate digital transformation" in the annual reports of selected manufacturing firms. The degree of digital transformation is measured accordingly.

Absorbed Slack Resources (ARS). Following the approach of Geiger and Cashen[29], absorbed slack resources are measured by the ratio of administrative expenses to operating revenue.

Unabsorbed Slack Resources (NPRS). Following the approach of Geiger and Cashen[29], unabsorbed slack resources are measured using the quick ratio.

Dynamic Capabilities (DC). Dynamic capabilities are divided into three dimensions: absorptive capacity, innovative capacity, and adaptive capacity. These dimensions are measured based on the methods of Zhao et al[30] and Yang et al[18]. Absorptive Capacity represents the standardized value of the firm's annual R&D expenditure /operating revenue. Innovative Capacity represents the sum of the standardized value of the firm's annual R&D intensity and the standardized value of the proportion of technical personnel. Adaptive Capacity represents the coefficient of variation of the firm's annual R&D expenditure, capital expenditure, and advertising expenditure.

Executives' Digital Background (DB). Following the approach of Wang et al[31], executives whose academic majors include “information, intelligence, software, communication, or computer science” are considered as having a digital background. The variable is calculated as the proportion of such executives in the total executive team.

Control Variables. Drawing on relevant studies, this paper selects the following control variables: leverage ratio (Lev), firm size (Size), total asset turnover ratio (Atr), operating revenue growth rate (Growth), firm age (Age), property rights nature (Soe), return on equity (Roe), and CEO duality (Dual).

4. Results

4.1. Descriptive Analysis

As shown in Table1 , the degree of corporate digital transformation varies considerably across firms, with a median value of 0.073, indicating that most firms have a relatively low level of digital transformation. Absorbed slack resources and unabsorbed slack resources also exhibit substantial variation across firms. The variance inflation factor (VIF) for each variable is below 10, suggesting that multicollinearity is not a concern.

Table 1. Descriptive Statistic

	DT	ARS	NPRS	DC	DB	Lev	Size	Atr	Growth	Age	Soe	Roe	Dual
DT	1												
ARS	0.192***	1											
NPRS	0.123***	0.227***	1										
DC	0.320***	0.357***	0.328***	1									
DB	0.124***	0.089***	0.085***	0.171***	1								
Lev	0.000	-0.224***	-0.743***	-0.205***	-0.012	1							
Size	0.016*	-0.357***	-0.322***	-0.157***	-0.049***	0.405***	1						
Atr	-0.113***	-0.497***	-0.179***	-0.248***	-0.050***	0.163***	0.126***	1					
Growth	-0.015	-0.105***	-0.027**	-0.047***	0.017	0.025**	0.059***	0.154***	1				
Age	-0.001	-0.188***	-0.055***	-0.027***	-0.066***	0.078***	0.151***	0.031***	-0.088***	1			
Soe	-0.101***	-0.092***	-0.150***	-0.103***	-0.063***	0.204***	0.311***	0.105***	-0.058***	0.174***	1		
Roe	-0.054***	-0.214***	0.172***	-0.058***	0.004	-0.274***	0.122***	0.239***	0.271***	-0.024***	-0.018**	1	
Dual	0.070***	0.065***	0.069***	0.099***	0.065***	-0.062***	-0.129***	-0.059***	0.020**	-0.092***	-0.285***	0.006	1
Mean	0.093	0.070	1.479	-0.247	0.018	0.437	22.459	0.683	0.137	3.039	0.307	0.050	0.293
Median	0.073	0.063	1.187	-0.364	0.000	0.432	22.327	0.611	0.092	3.045	0.000	0.063	0.000
Max	0.425	0.206	5.344	6.523	0.444	0.859	25.971	2.088	1.628	3.664	1.000	0.319	1.000
Min	0.006	0.010	0.278	-4.458	0.000	0.109	20.011	0.173	-0.445	2.303	0.000	-0.715	0.000
SD	0.075	0.038	0.963	1.928	0.069	0.172	1.188	0.345	0.305	0.265	0.461	0.138	0.455
VIF		1.690	2.420	1.290	1.050	2.710	1.500	1.440	1.110	1.090	1.240	1.380	1.100

4.2. Regressions Analysis

The data analysis employed a fixed-effects model using Stata 17. The baseline regression results for the main effects are shown in Table 2. Model 1 includes only the independent variable absorbed slack resources (ARS) and the dependent variable corporate digital transformation (DT) to facilitate examination of the relationship between the two. Model 2 presents the regression results of absorbed slack resources and corporate digital transformation after adding control variables. The results show that absorbed slack resources ($\beta=0.126$, $p<0.01$) have a significant positive correlation with corporate digital transformation, providing support for Hypothesis H1. Model 3 includes only the independent variable unabsorbed slack resources (NPRS) and the dependent variable corporate digital transformation (DT) to facilitate examination of the relationship between the two. Model 4 presents the regression results of unabsorbed slack resources and corporate digital transformation after adding control variables. The results show that unabsorbed slack resources ($\beta=0.00292$, $p<0.01$) have a significant positive correlation with corporate digital transformation, supporting Hypothesis H2.

Table 2. Regression analysis of the main effects.

	Model 1	Model 2	Model 3	Model 4
ARS	0.0559** (2.44)	0.126*** (4.79)		
NPRS			0.00199** (2.23)	0.00292*** (2.65)
Lev		-0.00704 (-1.20)		0.00253 (0.35)
Size		0.0184*** (11.59)		0.0163*** (10.51)
Atr		0.00209 (0.64)		-0.00294 (-0.95)
Growth		-0.000540 (-0.32)		-0.00104 (-0.62)
Age		-0.0248* (-1.84)		-0.0253* (-1.89)
Soe		-0.00834** (-2.39)		-0.00794** (-2.28)
Roe		0.00239 (0.54)		-0.000336 (-0.08)
Dual		0.00133 (0.86)		0.00122 (0.79)
cons	0.0899*** (54.84)	-0.250*** (-4.73)	0.0909*** (66.79)	-0.197*** (-3.83)
Company	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
r ²	0.782	0.786	0.782	0.785
r ² _a	0.732	0.737	0.732	0.737

4.3. Mediation Effect Analysis of Dynamic Capabilities

This paper employs the three-step mediation effect testing method to examine the mediating role of dynamic capabilities. The results are shown in Table 3.

Firstly, we test the mediating role of dynamic capabilities (DC) between absorbed slack resources (ARS) and corporate digital transformation (DT). Model 5 shows that the regression coefficient of absorbed slack resources on corporate digital transformation is significantly positive ($\beta=0.126$, $p<0.01$). Model 6 shows that absorbed slack resources positively affect dynamic capabilities ($\beta = 6.633$, $p<0.01$). In Model 7, the regression coefficient of absorbed

slack resources on corporate digital transformation remains significantly positive ($\beta=0.112$, $p<0.01$), and the regression coefficient of dynamic capabilities on corporate digital transformation is also significantly positive ($\beta = 0.00208$, $p < 0.01$). Moreover, the regression coefficient of absorbed slack resources on corporate digital transformation in Model 7 is lower than that in Model 5 ($\beta=0.126$). In summary, dynamic capabilities play a partial mediating role between absorbed slack resources and corporate digital transformation, providing support for Hypothesis H3.

Next, we test the mediating role of dynamic capabilities (DC) between unabsorbed slack resources (NPRS) and corporate digital transformation (DT). Model 8 shows that the regression coefficient of unabsorbed slack resources on corporate digital transformation is significantly positive ($\beta=0.00292$, $p<0.01$). Model 9 shows that unabsorbed slack resources positively affect dynamic capabilities ($\beta=0.0597$, $p<0.05$). In Model 10, the regression coefficient of unabsorbed slack resources on corporate digital transformation remains significantly positive ($\beta=0.00278$, $p<0.05$), and the regression coefficient of dynamic capabilities on corporate digital transformation is significantly positive ($\beta=0.00232$, $p<0.01$). Furthermore, the regression coefficient of unabsorbed slack resources on corporate digital transformation in Model 10 is lower than that in Model 8 ($\beta=0.00292$). In summary, dynamic capabilities play a partial mediating role between unabsorbed slack resources and corporate digital transformation, these results support Hypothesis H4.

Table 3. Mediation Effect Test of Dynamic Capabilities

Variables	Model 5 DT	Model 6 DC	Model 7 DT	Model 8 DT	Model 9 DC	Model 10 DT
ARS	0.126*** (4.79)	6.633*** (11.33)	0.112*** (4.24)			
NPRS				0.00292*** (2.65)	0.0597** (2.42)	0.00278** (2.52)
DC			0.00208*** (4.10)			0.00232*** (4.60)
Lev	-0.00704 (-1.20)	-0.962*** (-7.39)	-0.00503 (-0.86)	0.00253 (0.35)	-0.812*** (-5.06)	0.00442 (0.61)
Size	0.0184*** (11.59)	-0.0106 (-0.30)	0.0184*** (11.62)	0.0163*** (10.51)	-0.108*** (-3.10)	0.0166*** (10.68)
Atr	0.00209 (0.64)	-0.0643 (-0.88)	0.00222 (0.68)	-0.00294 (-0.95)	-0.344*** (-4.99)	-0.00214 (-0.69)
Growth	-0.000540 (-0.32)	-0.173*** (-4.62)	-0.000181 (-0.11)	-0.00104 (-0.62)	-0.201*** (-5.36)	-0.000576 (-0.34)
Age	-0.0248* (-1.84)	0.877*** (2.94)	-0.0266** (-1.98)	-0.0253* (-1.89)	0.829*** (2.76)	-0.0273** (-2.03)
Soe	-0.00834** (-2.39)	0.114 (1.47)	-0.00857** (-2.46)	-0.00794** (-2.28)	0.137* (1.75)	-0.00826** (-2.37)
Roe	0.00239 (0.54)	-0.498*** (-5.10)	0.00343 (0.78)	-0.000336 (-0.08)	-0.662*** (-6.80)	0.00120 (0.28)
Dual	0.00133 (0.86)	0.0381 (1.11)	0.00125 (0.81)	0.00122 (0.79)	0.0332 (0.96)	0.00114 (0.74)
_cons	-0.250*** (-4.73)	-2.676** (-2.28)	-0.244*** (-4.63)	-0.197*** (-3.83)	0.164 (0.14)	-0.198*** (-3.84)
Company	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
r2	0.786	0.840	0.786	0.785	0.838	0.786
r2_a	0.737	0.804	0.738	0.737	0.801	0.737

4.4. The Moderating Role of Executives' Digital Background

The moderating role of executives' digital background on the relationship between slack resources and digital transformation was tested, and the results are shown in Table 4. According to Models 11 and 12, after adding the interaction term between absorbed slack resources (ARS) and executives' digital background (DB), the regression coefficient of the interaction term (ARS×DB) was significantly positive ($\beta=0.523$, $p<0.01$). This indicates that executives with a digital background positively moderate the relationship between absorbed slack resources and digital transformation. Thus, Hypothesis H5 is supported.

Models 13 and 14 show that after adding the interaction term between unabsorbed slack resources (NPRS) and executives' digital background (DB), the regression coefficient of the interaction term (NPRS×DB) was not significant ($\beta=0.00131$). Therefore, the positive moderating effect of executives' digital background on the relationship between unabsorbed slack resources and digital transformation cannot be established. Thus, Hypothesis H6 is not supported.

Table 4. Moderating Effect Test

Variables	Model 11 DT	Model 12 DT	Model 13 DT	Model 14 DT
ARS	0.126*** (4.79)	0.110*** (4.08)		
ARS_DB		0.523*** (3.01)		
NPRS			0.00292*** (2.65)	0.00296*** (2.62)
NPRS_DB				0.00133 (0.17)
Lev	-0.00704 (-1.20)	-0.00658 (-1.12)	0.00253 (0.35)	0.00264 (0.37)
Size	0.0184*** (11.59)	0.0184*** (11.56)	0.0163*** (10.51)	0.0165*** (10.61)
Atr	0.00209 (0.64)	0.00279 (0.85)	-0.00294 (-0.95)	-0.00242 (-0.78)
Growth	-0.000540 (-0.32)	-0.000769 (-0.46)	-0.00104 (-0.62)	-0.00115 (-0.68)
Age	-0.0248* (-1.84)	-0.0227* (-1.69)	-0.0253* (-1.89)	-0.0255* (-1.90)
Soe	-0.00834** (-2.39)	-0.00872** (-2.50)	-0.00794** (-2.28)	-0.00814** (-2.33)
Roe	0.00239 (0.54)	0.00230 (0.52)	-0.000336 (-0.08)	-0.000107 (-0.02)
Dual	0.00133 (0.86)	0.00155 (1.00)	0.00122 (0.79)	0.00137 (0.88)
DB		-0.0711*** (-3.95)		-0.0311* (-1.77)
_cons	-0.250*** (-4.73)	-0.254*** (-4.82)	-0.197*** (-3.83)	-0.201*** (-3.89)
Company	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
r ²	0.786	0.786	0.785	0.785
r ² _a	0.737	0.738	0.737	0.737

5. Summary

Through empirical analysis, we have reached the following important conclusions: (1) Both absorbed slack resources and unabsorbed slack resources positively promote corporate digital transformation; (2) The positive effects of both absorbed slack resources and unabsorbed slack resources on corporate digital transformation are mediated by dynamic capabilities; (3) Executives' digital background positively moderates the promoting effect of absorbed slack resources on digital transformation.

This study makes two main theoretical contributions. First, Although scholars have recognized the impact of slack resources on corporate digital transformation in the literature on digital transformation, little attention has been paid to the underlying transmission pathways. This study investigates the role of dynamic capabilities in the process which slack resources influence digital transformation, thereby enriching the research on the transmission pathways from slack resources to digital transformation. Second, this study introduces executives' digital background as a moderating variable to explore its moderating role in the relationship between slack resources and corporate digital transformation. The findings reveal that executives' digital background positively moderates the promoting effect of absorbed slack resources on digital transformation, whereas its moderating effect on the relationship between unabsorbed slack resources and digital transformation is not significant. The results demonstrate the heterogeneous moderating role of executives' digital background in the relationship between distinct types of resource slack and digital transformation.

The research findings have certain implications for both the theory and practice of digital transformation, while also presenting some limitations that warrant further exploration in future research. First, Future research could consider other industries. Second, future studies could further explore additional factors that may facilitate the transformation of slack resources into dynamic capabilities, thereby supporting the digital transformation process; Third, enriching research on the differential boundary conditions between different types of resource slack and digital transformation is essential.

References

- [1] Guo, C. E., Wang, Q., & Su, Z. F. (2023). Value realization of firms' digital transformation: International research progress and prospects. *Science of Science and Management of S.&T.*, 44(6), 32-49.
- [2] Sun, X. H., Ma, X. J., Kong, Y. J., & Li, H. (2025). The digital divide in China's manufacturing industry: An analytical framework of "Access-Application-Transformation". *Management World*, 41(4), 38-58.
- [3] McAfee, A., Brynjolfsson, E., Davenport, T. H., Patil, D. J., & Barton, D. (2012). Strategy & competition big data: The management revolution. *Harvard Business Review*, 90(10), 60-68.
- [4] Ardolino, M., Rapaccini, M., Sacconi, N., Gaiardelli, P., Crespi, G., & Ruggeri, C. (2018). The role of digital technologies for the service transformation of industrial companies. *International Journal of Production Research*, 56(6), 2116-2132. <https://doi.org/10.1080/00207543.2017.1324224>
- [5] Ly, B. (2026). Leadership agility and digital transformation as drivers of organizational agility: The conditioning role of technology infrastructure in a developing economy. *Global Journal of Flexible Systems Management*, 27(2), 425-440.
- [6] Piccoli, G., Grover, V., & Rodriguez, J. (2024). Digital transformation requires digital resource primacy: Clarification and future research directions. *The Journal of Strategic Information Systems*, 33(2), 101835. <https://doi.org/10.1016/j.jsis.2024.101835>
- [7] Chen, D. M., Wang, L. Z., & Chen, A. N. (2020). Digitalization and strategic management theory: Review, challenges and prospects. *Management World*, 36(5), 220-236.

- [8] Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28(13), 1319-1350. <https://doi.org/10.1002/smj.640>
- [9] Wang, C. L., & Ahmed, P. K. (2007). Dynamic capabilities: A review and research agenda. *International Journal of Management Reviews*, 9(1), 31-51. <https://doi.org/10.1111/j.1468-2370.2007.00201.x>
- [10] Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review*, 9(2), 193-206. <https://doi.org/10.5465/amr.1984.4277628>
- [11] Sacavém, A., de Bem Machado, A., dos Santos, J. R., Palma-Moreira, A., Belchior-Rocha, H., & Au-Yong-Oliveira, M. (2025). Leading in the digital age: The role of leadership in organizational digital transformation. *Administrative Sciences*, 15(2), 43. <https://doi.org/10.3390/admsci15020043>
- [12] Sharfman, M. P., Wolf, G., Chase, R. B., & Tansik, D. A. (1988). Antecedents of organizational slack. *Academy of Management Review*, 13(4), 601-614. <https://doi.org/10.5465/amr.1988.4307437>
- [13] Miller, D. (2019). The resource-based view of the firm. In *Oxford Research Encyclopedia of Business and Management*. Oxford University Press. <https://doi.org/10.1093/acrefore/9780190224851.013.13>
- [14] Wang, Y. N., & Cheng, X. S. (2014). Environmental uncertainty, absorbed slack resources and firm innovation: Empirical evidence based on Chinese manufacturing listed companies. *Studies in Science of Science*, 32(8), 1242-1250.
- [15] Shalender, K., & Yadav, R. K. (2019). Strategic flexibility, manager personality, and firm performance: The case of Indian automobile industry. *Global Journal of Flexible Systems Management*, 14(3), 1-14. <https://doi.org/10.1007/s40171-019-00217-5>
- [16] Jiang, W. P., & Liu, D. D. (2016). Research on the relationship among R&D investment, slack resources and corporate performance. *Finance Theory and Practice*, 37(5), 57-62.
- [17] Wang, X. H., Li, N., & Chen, Y. (2022). Slack resources moderation, digital transformation and high-quality development of enterprises. *Journal of Shanxi University of Finance and Economics*, 44(8), 72-84.
- [18] Yang, L., He, X., & Gu, H. F. (2020). Top management team experience, dynamic capabilities and corporate strategic mutation: The moderating effect of managerial discretion. *Management World*, 36(6), 168-188, 201, 252.
- [19] Ellström, D., Holtström, J., & Berg, E. (2022). Dynamic capabilities for digital transformation. *Journal of Strategy and Management*, 15(2), 15-33. <https://doi.org/10.1108/JSMA-04-2021-0087>
- [20] Falco, S. E. D., & Renzi, A. (2015). The role of sunk cost and slack resources in innovation: A conceptual reading in an entrepreneurial perspective. *Entrepreneurship Research Journal*, 5(3), 167-179. <https://doi.org/10.1515/erj-2014-0023>
- [21] Tabesh, P., Vera, D., & Keller, R. T. (2019). Unabsorbed slack resource deployment and exploratory and exploitative innovation: How much does CEO expertise matter? *Journal of Business Research*, 94, 65-80. <https://doi.org/10.1016/j.jbusres.2018.09.010>
- [22] Lian, Y. L., Liu, J. L., & Chen, Q. (2016). Bankruptcy threat and strategic change: A study on the moderating effects of organizational resources and market munificence. *Foreign Economics & Management*, 38(10), 20-34.
- [23] Deng, C., Kong, F., Zhu, R., & Wang, X. (2024). Balance or not: Configuring absorbed and unabsorbed slack resources to achieve supply chain resilience. *Operations Management Research*, 17(4), 23-41. <https://doi.org/10.1007/s12063-024-00271-7>
- [24] Wang, F. R., Guo, M., Yin, S. Q., & Zhang, Y. (2025). Research on the impact of top management team attention on digital transformation in manufacturing enterprises: A case study of Hikvision. *Science of Science and Management of S.&T.*, (9), 154-165.

- [25] Kretschmer, T., & Khashabi, P. (2020). Digital transformation and organization design: An integrated approach. *California Management Review*, 62(4), 86-104. <https://doi.org/10.1177/0008125620940296>
- [26] Porfirio, J. A., Carrilho, T., Felicio, J. A., & Jardim, J. (2021). Leadership characteristics and digital transformation. *Journal of Business Research*, 124, 610-619. <https://doi.org/10.1016/j.jbusres.2020.10.028>
- [27] Haislip, J. Z., & Richardson, V. J. (2018). The effect of CEO IT expertise on the information environment: Evidence from earnings forecasts and announcements. *Journal of Information Systems*, 32(2), 71-94. <https://doi.org/10.2308/isys-51969>
- [28] Wu, F., Hu, H. Z., Lin, H. Y., & Ren, X. (2021). Corporate digital transformation and capital market performance: Empirical evidence from stock liquidity. *Management World*, 37(7), 130-144, 10.
- [29] Geiger, S. W., & Cashen, L. H. (2002). A multidimensional examination of slack and its impact on innovation. *Journal of Managerial Issues*, 14(1), 68-84.
- [30] Zhao, F., Wang, T. N., & Wang, Y. (2016). External technology acquisition and product diversification in open innovation: The moderating role of dynamic capabilities. *Management Review*, 28(6), 76-85, 99.
- [31] Wang, C., Yu, D. F., & Long, R. (2023). Economic policy uncertainty and corporate digitalization: A stepping stone or a stumbling block? *Economic Management Journal*, 45(6), 79-100.