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The Impact of an Organization's Digital Transformation on the Long-Term M&A Performance

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Abstract: Based on the data of China's A-share listed companies from 2012 to 2022, this paper uses a benchmark regression model to explore the impact and mechanism of corporate digitization on long-term M&A performance. It is found that the higher the degree of corporate digitization, the worse the long-term M&A performance. This finding reverses the traditional view that digitization can effectively improve the operational efficiency of enterprises and the quality of M&A decisions. This finding still holds after changing the enterprise digital transformation measure, replacing control variables, and lagging long-term M&A performance by one period. This paper provides new perspectives on the risk points that companies may overlook in pursuing digital transformation, aiming to help companies use information to make rational decisions and use digitalization to predict future developments accurately. This study emphasizes the need for managers to balance long-term and short-term interests and identify and prevent short-sightedness issues, providing insights for managers to balance immediate benefits and sustainable development in a complex and changing business environment, which is essential for enterprises to deploy strategic plans in the current fast-changing economic environment.

Keywords: Digital Transformation, Merger & Acquisition, Corporate Performance

1. Introduction

Since the 18th CPC National Congress, the CPC Central Committee has designated the digital transformation of enterprises as a national strategy. The 20th CPC National Congress advocates for the seamless integration and advancement of the digital and real economy, emphasizing the expedited implementation of the innovation-driven development strategy. This implies that digital transformation is now a crucial strategic approach for enterprises to navigate and lead market changes. In 2022, China's digital economy comprised 58% of the GDP, experiencing a year-on-year growth rate of 7.6%, surpassing the 5.4% GDP growth rate. The digital economy is emerging as a pivotal force propelling economic expansion. Current studies indicate that enterprise digital transformation contributes to enhancing information transparency, reducing information asymmetry, narrowing the scope for surplus manipulation, and augmenting the feasibility of managerial decision-making [1-4]. Liu et al. demonstrate that the digital transformation of firms can alleviate financing constraints and enhance innovation capabilities [5, 6]. Additionally, Na et al. reveal that digital transformation assists firms in fulfilling corporate social responsibility, enhancing ESG performance, accruing goodwill, and elevating risk-taking levels [7-9].

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Mergers and acquisitions (M&A) are necessary for enterprises to improve the efficiency of resource allocation and optimize the industrial structure. It also plays an essential role in increasing enterprises' production capacity and market share. In the past few years, the century of change and the epidemic of the century intertwined and superimposed, exacerbating the impact on the global financial markets. Relevant data show that the probability of corporate mergers and acquisitions failure is more than half in the international statistical context [10]. The presence of synergies, purchase premium imbalances, insufficient information on which to base decisions, and managerial overconfidence can offset the short-term increase in shareholder wealth and goodwill or even have a more severe impact in the long-term perspective. Liu and Wang's study shows that in China, the management of listed companies lacks strategic motives for M&A and the integrity of internal governance, which leads to mispricing in the M&A market and becomes an important causative factor for the M&A performance "thunderbolt" [11].

Regarding whether digital transformation enhances firms' long-term M&A performance, from a realistic business perspective, this paper argues that the degree of digital transformation is instead negatively related to long-term M&A performance for the following reasons:

Firstly, firms' digital transformation can help them effectively integrate and analyze their businesses, identify market trends, discover opportunities in new areas, and arrive at more accurate and efficient decisions. Digital technology also provides the basis for expanding diversified businesses and business models and can optimize enterprise systems and flexibly allocate resources to help enterprises achieve diversified operations. However, diversification leads to an increase in the number of management levels, and the increased level of information asymmetry due to cumbersome and slow information and decision-making is offset by the reduced information asymmetry due to digitalization's accelerated scope and speed of information flow. Managers risk overextending themselves by allocating resources unevenly and accelerating acquisitions, reducing long-term M&A performance. Secondly, large-scale digital transformation exposes traditional industries to forced transformation and recession, and traditional enterprises also run the risk of significant erosion of their goodwill and excessive digital investment requirements when acquired. Mergers and acquisitions of such firms increase the acquirer's market share in the short term, but predicting changes in long-term M&A performance is difficult. Finally, while digitization incentivizes firms to continue to innovate, it also breaks down the barriers in high-tech industries, elevating the status of investments in technology and reducing the importance of traditional fixed assets and inventories. Forcing firms to focus on market competition while innovating and emphasizing the importance of decision-making also exacerbates the risks and losses associated with rapid M&A decisions, which may affect a firm's long-term M&A performance if managers are misled by mixed messages or if decisions lack adequate investigation or critical information.

2. Methodology

2.1. Variable Construction

This paper selects data from Chinese A-share listed companies from 2012-2022 as the initial sample, and the data are all from CSMAR and CNRDS. The data are screened as follows to ensure the robustness of the research results: (1) The sample of ST firms with deteriorating operating conditions and *ST firms are excluded. (2) The sample of financial industry enterprises is excluded based on the research practice. (3) Samples with missing financial indicators are excluded. (4) 1% shrinkage for continuous variables before and after to control the impact of extreme values on the regression analysis.

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2.1.1. Explained Variable: Long-Term Merger and Acquisition Performance (ΔROA)

This study utilizes Cai and Sevilir's research as a reference for quantifying the variation in return on total assets (ROA) during the two-year periods preceding and following the initial announcement date. Specifically, it standardizes the annual ROA by industry norms, with the manufacturing sector classified using Level 2 codes and others categorized based on Level 1 codes [12]. The normalization process involves adjusting the return on total assets (ROA) for each year. It entails deducting the average ROA for the two years post-M&A completion (year t+1, year t+2) from the average ROA for the two years pre-M&A (year t-2, year t-1). The resulting value, denoted as the change in ROA (ΔROA), represents the variation in the return on total assets.

2.1.2. Explanatory Variables - Degree of Digital Transformation (Digdegree)

In this study, the text analysis approach introduced by Huaijin et al. is employed to establish a proxy variable for gauging the extent of digital transformation. This involves identifying intangible assets associated with digital transformation within the financial reports of publicly listed companies. Specifically, keywords such as "network," "intelligent platform," "management system," and "client," along with their corresponding patents, are designated as "digital intangible assets" [13]. To illustrate, terms like "network," "intelligent platform," "management system," and "client," describing technologies linked to digital transformation, are recognized as "digital intangible assets." The cumulative digital intangible assets for the same company within the same year are aggregated, and the proportion of intangible assets for the current year is computed. The refined details are then manually consolidated.

2.1.3. Control Variables

In line with prior studies, this research manages for firm-level attributes such as the growth rate of operating income (Growth), capital employed by major shareholders (Occupy), net profit margin on total assets (ROA), equity checks and balances (Balance2), total asset turnover (ATO), among others. These customary control variables are incorporated into the model to account for any omitted variables in the actual scenario, thus ensuring the impartial regression coefficients of both explanatory and dependent variables. The definitions of all variables utilized in this study are outlined in Table 1.

Table 1: Variable Definitions.

Characteristic	Name	Notation	Construction
Explained variable	Long-term M&A performance	ΔROA	Amount of change in return on total assets in the two years before and after the date of first announcement
Explanatory variables	Degree of digital transformation	Digdegree	Text Analysis Method
Control variable	Revenue growth rate	Growth	Operating income of the current year / operating income of the previous year - 1
	Utilization of Funds by Major Shareholders	Occupy	Other receivables divided by total assets
	Total Assets Net Profit Margin	ROA	Net profit/average balance of total assets
	Shareholding Balance	Balance2	The sum of the shareholding ratio of the second to fifth largest shareholders divided

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Table 1: (continued).

			by the shareholding ratio of the first largest shareholder
	Total Asset Turnover Ratio	ATO	Operating income/average total assets
	Gearing Ratio	Lev	Total liabilities at year-end divided by total assets at year-end
	Book-to-market ratio	BM	Book value/total market value

2.2. Modeling

To test the impact of the degree of digital transformation on long-term M&A performance, this paper sets up the following benchmark regression model:

$$\Delta ROA_{i,t} = a_0 + a_1\, Digdegree_{i,t} + \sum_k \gamma_k\, Control_{k,i,t} + Year, Industry\ fixed\ effects + \varepsilon_{i,t} \quad (1)$$

In equation (1), $\Delta ROA_{i,t}$denotes the long-term M&A performance of enterprise i in year t, and $Digdegree_{i,t}$denotes the degree of digital transformation of enterprise i in year t. The regression coefficient is significantly negative if the model (1) is valid.

2.3. Robustness Check

To further verify the robustness of the above findings, the paper also performs the following robustness tests.

First, replace the explanatory variables, the existing literature in addition to the use of the same year digital intangible assets ratio to measure the degree of enterprise digitization, Wu et al. also often on the text of the annual report listed companies to extract the "artificial intelligence", "big data", "cloud computing", "blockchain technology" and "digital technology applications" under the five categories of the characteristics of the words for the search, the matching [14]. Then, on the keyword word sum plus 1 to take the natural logarithm of the elimination of its "right-biased" characteristics, to get the overall indicators of the digital transformation of the enterprise (Digdegree1), the results of the regression are shown in Table 4, Column 2. Furthermore, Yuan et al. compiled a dictionary encompassing terms related to digitization by summarizing keywords from national-level policy documents concerning the digital economy. They calculated the frequency of each keyword in the Management Discussion and Analysis (MD&A) section of annual reports from listed companies and multiplied it by 100 to create an indicator, denoted as Digdegree2, measuring the extent of enterprise digitization [15]. The regression outcomes are detailed in Table 4, Column 3. Subsequently, a substitution of the combination of control variables is presented in Table 4, Column 4. Thirdly, acknowledging the persistence and continuity of the impact of firms' digitization on long-term M&A performance, the explanatory variables are lagged by one period (ΔROA+1), and the regression findings are exhibited in Table 4, Column 5. As can be seen from the results in Table 4, using several of the above methods for robustness testing, the regression coefficients of Digdegree2 of the degree of digitization of enterprises are all significant at the 5% level. The rest of them are all significant at the 1% level, and the basic conclusions of the model have not been substantially altered, which further illustrates the robustness of this paper's findings.

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3. Empirical Results

3.1. Descriptive Statistics

Table 2 presents the summary statistics for Chinese A-share listed companies spanning from 2012 to 2022, representing the initial sample. The data utilized are sourced from CSMAR and CNRDS. As illustrated in Table 2, the standard deviation for each variable is below 1, suggesting a distribution closer to the mean with minimal dispersion. This phenomenon reduces the uncertainty associated with the model. On the histogram, Digdegree, Growth, Balance2, and ATO exhibit right-skewed distributions, while the data distribution of ROA and Occupy is relatively symmetric. The maximum and minimum values for each variable are within comparable orders of magnitude, signifying the absence of outliers in this study and ensuring the precision of the benchmark regression.

Table 2: Summary Statistics.

Variable	mean	sd	P25	P50	P75	min	max
ΔROA	-0.00800	0.0820	-0.0280	-0.00200	0.0220	-0.392	0.246
Digdegree	0.1006	0.2334	0.0003	0.1131	0.0556	0	1
Growth	0.231	0.459	0.0110	0.151	0.336	-0.653	3.894
Occupy	0.0180	0.0260	0.00400	0.00900	0.0200	0	0.206
ROA	0.0450	0.0580	0.0180	0.0420	0.0720	-0.382	0.245
Balance2	0.704	0.600	0.240	0.531	1.007	0.0160	2.961
ATO	0.660	0.456	0.360	0.555	0.818	0.0550	3.106

Table 3 shows the correlations of these variables. The correlation analysis illustrated a small negative linear correlation (-0.029) between ΔROA and Digdegree, and this relationship was highly significant. This data suggests that there may be a correlation between the explained and explanatory variables, which still holds true despite the numerous control variables.

Table 3: Correlation Matrix.

	ΔROA	Digdegree	Growth	Occupy	ROA	Balance2	ATO
ΔROA	1						
Digdegree	-0.029***	1					
Growth	-0.003	0.046***	1				
Occupy	-0.017	0.083***	0.001	1			
ROA	-0.153***	-0.013	0.208***	-0.175***	1		
Balance2	-0.044***	0.055***	0.060***	-0.007	0.001	1	
ATO	0.017*	-0.071***	0.107***	-0.029***	0.171***	-0.067***	1

3.2. Regression Results

From Table 4, since the coefficient of Digdegree is harmful at the 1% level, it is found that the degree of digitization of an enterprise affects its long-term M&A performance. Specifically, the higher the degree of digitization, the higher the frequency of digitized words in financial reports as a proportion of intangibles, the higher the risk of facing reduced performance after a more extended period after M&A, and the more serious the impact of the reduced performance. Therefore, while companies pursuing rapid digital transformation and increasing investment in digital innovation are in line with the national strategic development trend, the reduction in M&A performance will be reflected after a more extended period after the M&A, and at the same time, lead to the risk of underfunding of

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investment in digital innovation in the future, lowering their competitiveness in the future and reducing their market share and further slowing down their digitization process, reducing innovation output, and limiting technology adoption. This situation could also prompt managers to take better control of their finances and change their business plans to minimize short-sighted behavior and overconfidence, perhaps providing management lessons and strategic changes for growth. At the same time, the firm faces the dilemma of reduced long-term M&A performance.

Table 4: Baseline regression results and model comparison.

	(1)	(2)	(3)	(4)	(5)
	ΔROA	ΔROA	ΔROA	ΔROA	ΔROA+1
Digdegree	-0.016*** (-2.840)			-0.016*** (-2.902)	-0.035*** (-3.135)
Digdegree1		-0.004** (-2.553)			
Digdegree2			-0.004*** (-3.697)		
Growth	0.005** (2.001)	0.006** (2.030)	0.006** (2.088)	0.005* (1.770)	-0.010** (-2.426)
Occupy	-0.134** (-2.546)	-0.135** (-2.567)	-0.125** (-2.379)		-0.032 (-0.421)
ROA	-0.272*** (-12.793)	-0.271*** (-12.705)	-0.272*** (-12.771)	-0.260*** (-11.202)	-0.311*** (-7.333)
Balance2	-0.004*** (-2.737)	-0.004*** (-2.783)	-0.004*** (-2.714)		-0.006** (-2.091)
ATO	0.016*** (6.434)	0.017*** (6.528)	0.017*** (6.591)	0.016*** (6.262)	0.013*** (2.918)
Lev				0.003 (0.459)	
BM				-0.001 (-0.821)	
Constant	0.014 (0.992)	0.000 (0.025)	0.001 (0.083)	-0.007 (-0.489)	0.036* (1.702)
Observations	7,397	7,397	7,397	7,397	2,678
R-squared	0.0785	0.0781	0.0792	0.0759	0.1131

3.3. Robustness Check

As shown in column 2 to 5 of Table 4, after replacing the explanatory variables measure, replacing two of the control variables as Lev and BM, and delaying the explanatory variables by one year, the negative correlation between the descriptive and interpreted variables does not lose its significance, implying that the results are very robust. The replacement of the explanatory variables in digital transformation means that digital transformation can be used to measure the degree of digitization of a firm in terms of the share of intangible assets, the classification under the five dimensions, and the aggregation of keywords from national policies can be used to measure the degree of digitization of a firm. Replacing the measure of digital transformation may slightly affect the degree of negative correlation but does not change the relationship. The control variables do not affect the significance or the degree of negative correlation between the explanatory and interpreted variables, indicating that the negative correlation between long-term M&A performance and the degree of digitization of

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a firm remains stable and independent even after controlling for other factors that may affect the results, suggesting that the degree of digitization of a firm may be an important factor affecting long-term M&A performance. Long-term M&A performance is still significantly negatively correlated with the degree of enterprise digitization after one year. The degree of negative correlation is even more significant, indicating that enterprise digitization is persistent in long-term M&A performance, emphasizing the importance of managers considering the long-term factors in formulating M&A strategy, and the success of M&A also depends on how to continue to manage and integrate the enterprise through digitization after the M&A Review, which also suggests that managers should not only consider immediate costs and costs but also take into account the cost and benefits of enterprise digitization in making their decisions. It should consider not only the immediate costs and benefits but also how to use digitization to achieve effective risk management and value creation after the M&A.

4. Conclusion

This study conducts an empirical analysis to assess the influence of enterprise digital transformation on the long-term performance of M&A. The findings reveal a substantial decrease in the alteration of return on total assets during the two-year period surrounding the confirmation of M&A transactions in the context of enterprise digital transformation. Notably, a significant inverse correlation is observed, indicating that enterprise digital transformation is associated with a reduction in long-term M&A performance. The limitations of this paper are: Firstly, uncertainty and subjectivity in the acquisition of data, the text analysis method will be affected by the enterprise due to financial forgery or whitewash and manual screening of keywords. Although it can avoid the prevalence of the Python algorithm, personal bias and subjectivity may affect the interpretation of the data and conclusions. Secondly, the inadequacy of experimental control: the experiment may not be able to add all control variables, resulting in the results of questionable validity. Thirdly, the findings are limited by time and geography to data from 2012-2022 for Chinese A-share listed companies, limiting the long-term validity of the conclusions and making it difficult to ensure that the findings apply to other regions. This paper provides insights and implications in terms of providing suggestions for the importance and assessment methods of managers' examination of the actual value of firms in M&A. Then, the paper provides insights for the relevant authorities to adjust accounting standards, improve the digitization degree and M&A performance measurement, and reduce incorrect assessments due to information asymmetry. Finally, the paper points out that, as one of the focuses of firms' competence development for managers, firms should Take advantage of the advantages of digital transformation in improving information transparency and innovation to help managers reduce short-sightedness and realize their potential.

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