Print ISSN: 1738-3110 / Online ISSN 2093-7717
JDS website: http://accesson.kr/jds
http://doi.org/10.15722/jds.22.12.202412.111

Strategic Resource Distribution in M&A: The Influence of Digitalization and TMT Overconfidence*

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Received: October 18, 2024. Revised: November 19, 2024. Accepted: December 05, 2024.

Abstract

Purpose: This study examines the impact of digitalization on M&A investment activities, focusing on distribution processes and the moderating role of top management team (TMT) overconfidence. Based on Transaction Cost Economics (TCE) and Upper Echelons Theory, we analyze how digital technologies influence M&A decisions and how managerial cognitive biases affect this relationship. **Research Design, Methodology, and Approach:** We argue that digitalization enhances distribution efficiency by improving supply chain communication, streamlining operations, integrating advanced analytics, reducing transaction costs, and enabling better information processing. This can lead to improved M&A investments. Using a sample of U.S. manufacturing firms from 1994 to 2015, partial least squares structural equation modeling (PLS-SEM) was employed. **Results:** The findings show that digitalization positively affects M&A investments and distribution efficiency. However, overconfident TMTs weaken this positive effect. **Conclusions:** Our study highlights the importance of considering distribution and managerial traits in M&A decisions during the digital era. We acknowledge the limitation of not directly measuring distribution advantages due to a focus on manufacturing firms and suggest future research in settings where distribution effects are clearer.

Keywords : Digitalization, M&A, Transaction Cost Economics (TCE), TMT Overconfidence, Upper Echelons Theory, Distribution Process

JEL Classification Code : L25, L26, M16, M31, M38

1. Introduction

The success of M&A largely depends on the effectiveness of the distribution strategy. Effective distribution strategy involves facilitating supply chains, minimizing costs, and ensuring the smooth integration of both acquiring and target firms. In this regard, digitalization is a powerful tool that can enhance distribution strategies, enabling more efficient transitions and promoting operational synergies. Despite these advantages, there needs to be more understanding of how digitalization impacts distribution processes within the framework of M&A activities, particularly regarding investment decisions. (Tu & He, 2023). Therefore, to address this gap, this study explores the relationship between digitalization and M&A activities based on Transaction Cost Theory (TCE). TCE

* This work was supported by a Humanities.Social-Science Research Promotion of Pusan National University (2022~2024)

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suggests that digitalization allows firms to reduce the costs of searching, collecting, identifying, and analyzing information about potential target firms, which improves efficiency and reduces information asymmetry between acquirers and target firms. As a result, this can lead to increased M&A engagement.

In high-risk strategic resource distribution processes like M&A, the values, traits, and cognitive biases of the top management team (TMT) are crucial, given their role as key decision-makers (Hambrick & Mason, 1984). To fully understand a company's strategic allocation, it is important to consider TMT characteristics collectively. However, most studies have focused on TMT traits as primary variables rather than considering them as situational or contingency factors (Nadolska & Barkema, 2014). This study aims to fill this gap by examining TMT overconfidence as a contextual factor in the relationship between digitalization and M&A investment. Overconfident TMTs often overestimate their abilities and the potential benefits of M&A deals, leading to biased decisions and suboptimal outcomes (Malmendier & Tate, 2008). They may not emphasize the objective aspects of digitalization, such as data-driven decision-making or information analysis, preferring to rely on their experience or intuition. It can lead to overlooking the valuable insights that digital technology can provide, reducing the effectiveness of digitalization in facilitating successful M&A transactions. Therefore, this study proposes that TMT overconfidence may weaken the positive relationship between digitalization and M&A investments, as overconfident TMTs are more likely to rely on subjective judgment rather than data-driven insights from digital technologies. This finding underscores the potential risks of overconfidence in TMT and the need for caution in M&A decision-making.

This study makes several contributions to the strategic management literature. First, incorporating TCE theory expands the understanding of how digitalization influences M&A investments. While earlier research has highlighted the importance of digitalization, the direct impact on M&A activities still needs to be explored. By integrating TCE, this study provides empirical evidence on how digital transformation can reduce transaction costs, improve information processing, and enhance M&A engagement. Based on TCE, the paper offers new insights into the strategic implications of digitalization in high-risk investments like M&A. Second, this study contributes to the TMT literature by exploring overconfidence as a contingency factor rather than a direct driver of M&A decisions. Most strategic management research has focused on TMT traits as significant determinants of strategic outcomes, often overlooking how these traits interact with firm-level predictors like digitalization. However, this study offers valuable insights into the complex relationship between digital transformation and managerial characteristics, specifically how TMT overconfidence affects the link between digitalization and M&A investments. Third, the findings are also relevant for practitioners and policymakers. The results show that digital technologies play a key role in enabling M&A activities while also underscoring the potential effects of TMT overconfidence. The findings indicate that overconfident TMTs can hinder the benefits of digitalization in M&A processes. However, it's important to note that digitalization also brings significant benefits, such as improved efficiency and reduced costs. This highlights the importance for firms to avoid overreliance on subjective judgment and instead prioritize objective, data-driven information in their M&A decision-making. These findings offer unique guidance for companies seeking to improve their M&A strategies in the digital era.

2. Literature Review and Hypotheses

M&A is an important strategic activity for firms. TCE offers crucial insights into understanding M&A activities (Nagle et al., 2024). According to Coase (1937), M&A represents one of the alternative forms of a firm's market mechanism, whereby firms elect to undertake economic activities internally when the market transaction costs associated with these activities exceed the costs of internal organization. In other words, the motivation for M&A stems from the reduction of transaction costs through vertical or horizontal integration of firms (Weston & Mitchell, 2004; Williamson, 1985).

However, despite the intention to reduce transaction costs, many M&A activities result in failure. Christensen et al. (2011) assert that the failure rate of mergers and acquisitions is estimated to be between 70-90%, with one of the primary reasons being the increase in transaction costs due to information asymmetry. This suggests that managing information asymmetries is critical for successful M&A. To reduce such information asymmetries, firms employ various strategies, and digital transformation has emerged as a key approach (Dana & Orlov, 2014). Digital transformation effectively mitigates transaction information asymmetries and lowers external transaction costs by reducing search and contracting expenses (Dana & Orlov, 2014; Kuhn & Mansour, 2014). Additionally, it can decrease internal organizational costs by improving internal communication, optimizing organizational structure, and enhancing corporate decision-making and governance. Further digital transformation significantly influences the efficiency of distribution channels in M&A transactions by reducing costs, enhancing communication, and improving integration strategies. For examples, the integration of e-commerce channels with traditional distribution systems can provide

manufacturers with strategic advantages, although the efficiency of these channels must be adequately high to be beneficial (Lu & Liu, 2015). Despite this, there is still a lack of research on how the digitalization of firms influences their M&A investments (Tu & He, 2023). Therefore, the first purpose of this study aims to explore the effect of digitalization on M&A.

According to TCE, effective management during the M&A process is also an important factor in making an M&A successful. In particular, the upper echelon theory posits that TMTs, as the primary decision-makers in corporations, exert a significant influence on strategic decision-making processes. Prior literature extensively suggest that TMT's attributes are key determinants for organizational strategy when it comes to important M&A investment (Haspeslagh & Jemison, 1991; Hayward & Hambrick, 1997). For example, Nadolska and Barkema (2014) examine that TMT with a M&A experience affects the success and frequency of M&A. Also, El-Khatib et al. (2015) demonstrate that high network centrality in CEOs, which measures the extent and strength of their personal connections, is associated with a greater frequency of M&A deals that frequently result in significant value losses for both the acquirer and the combined entity. Moreover, Plaksina et al. (2019) present the findings of an empirical study indicating that CEOs with high achieved social status tend to curtail M&A activity immediately following the acquisition of such status, a phenomenon that can result in substantial value destruction in the period surrounding deal announcements.

The distinct values, traits, and behaviors of TMTs have a significant influence on M&A investment, which is a strategic activity for organizations. In this context, it is particularly crucial to examine TMT overconfidence not as a main predictor but as a contextual factor that interacts with firm-level predictors, such as digitalization, in shaping M&A investment outcomes. Given that TMTs are the key decision-makers within a firm, their subjective characteristics can have a profound impact on how firm-level resources are utilized and how strategic decisions are made. The interplay between TMT overconfidence and firm-level factors, such as digitalization, is therefore essential to understanding the dynamics of M&A activities. This is because overconfident TMTs may rely more on their judgment and intuition rather than on objective insights provided by digitalization, potentially diminishing the positive impact of data-driven strategies on M&A investment. Consequently, this study emphasizes the importance of viewing TMT overconfidence as a crucial moderating factor in the relationship between digitalization and M&A investment, reflecting how TMT's cognitive biases can influence the efficiency and effectiveness of firm-level predictors in strategic decision-making. This approach allows for a more comprehensive understanding of how TMT overconfidence interacts with digitalization, shaping the overall M&A investment strategy. Figure 1 presents the research model of this study.

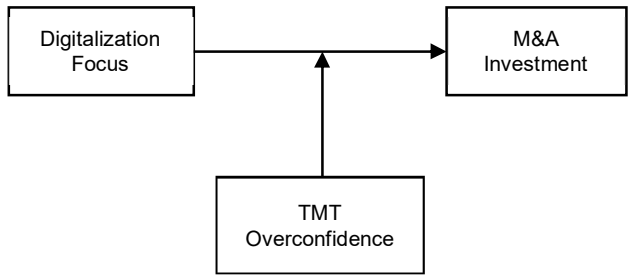

Figure 1: A Research Model

2.1. Digitalization Focus

There has yet to be a consensus among scholars regarding the precise definition of digitalization. Tilson et al. (2010) define digitalization as a socio-technical process whereby digital technologies become integrated within the broader context of social institutions. Similarly, Autio (2017) defines digitalization as the impact of digital technologies and infrastructures on businesses and society. De Reuver et al. (2018) identify three key drivers behind digitalization: competitive risks, network effects, and utilizing big data and algorithms. The extant literature demonstrates that digitalization has a considerable impact on a range of activities undertaken by firms, including operations, value creation, information quality, and overall firm performance (Wang et al., 2024). For example, implementing and promoting digital technologies makes it possible to make data-driven decisions, optimize resource allocation, and improve management efficiency (Nambisan et al., 2017).

Moreover, firms' focus on digital technology significantly impacts the distribution process. The enhanced integration improves operational efficiency and reduces information asymmetry, particularly in M&As (Pirvulescu & Enevoldsen, 2019). Digitalization enables firms to obtain market information in real time, reducing unnecessary costs and optimizing decision-making during M&A processes. As a result, digitalization can enhance operational efficiency and decision-making in the firm's strategic distribution. Furthermore, digitalization influences firms' investment behaviors, including M&A activities. The digitization of communication technologies, for instance, enables firms to gather and process market information with greater efficiency and to remain apprised of the latest developments in their industry in real-time (Brieger et al., 2022). It reduces information asymmetry, which is of critical importance in the context of successful M&A transactions (Etemad et al., 2010). In essence, digitalization can enhance firms' strategic

investment activities by reducing unnecessary costs, improving efficiency in information seeking, and enabling more accurate predictions of the growth potential of target firms.

Consequently, digitalization can enhance the distribution process in the context of M&A. It is mainly achieved through improved communication and enabled data-driven decision-making (Mosch et al., 2021). Such factors can contribute to the overall success of M&A transactions by ensuring operational synergies and reducing transaction costs.

Recent empirical findings suggest a positive relationship between digitalization and M&A. For example, Zhang and Peng (2023) found that digital transformation positively affected cross-border M&A among Chinese listed firms between 2009 and 2022. Moreover, Wang et al. (2024) demonstrated that digitalization increased the probability of cross-border M&A completion, particularly in technology-driven transactions. The role of digitalization in improving operational efficiency and reducing information asymmetry within supply chains is crucial, as it facilitates smoother integration and communication, thereby contributing to the overall success of M&A activities. Based on the above, we suggest that:

H1: Digitalization is positively associated with M&A investments.

2.2. TMT Overconfidence

TMT overconfidence, a cognitive bias, can be a contextual factor that affects the effect of digitalization on the investment in M&A. According to the Upper Echelons Theory, understanding the psychological traits, attitudes, and values of top management, who are the key decision makers in a firm, can predict how they make strategic decisions under environmental uncertainty (Hambrick & Mason, 1984). Based on the idea that a firm's outcomes reflect the values and cognitive bases of TMTs, Hambrick (2007) argues that it is important to consider the biases of executives. In particular, the traits of the TMT can be a salient contextual variable in determining activities that involve a high degree of uncertainty and risk, such as M&A activities (Sherman, 2010; Gaughan, 2013). Among the various TMT dispositions, scholars have focused on a level of TMT's confidence as a key variable affecting M&A activity and performance. Overconfidence is typically defined as a psychological trait that causes individuals to possess a subjective sense of confidence in their judgments, which may exceed their objective accuracy (Klayman et al., 1999). Overconfidence manifests when individuals overestimate their abilities, place excessive reliance on their prior experience, or assign excessive value to the precision of their personal information (Moore & Healy, 2008). Researchers have examined whether the level of confidence influences various firms' strategies and outcomes—such as R&D investment (Koh et al., 2018), innovation (Simon & Houghton, 2003), and new venture investment (Koellinger et al., 2007). Additionally, there is a stream of research that focuses on the overconfidence of TMT in explaining biased behavior in the context of M&A activities (Simon & Houghton, 2003; Malmendier & Tate, 2008; Tang et al., 2020; Twardawski & Kind, 2023). For example, Malmendier and Tate (2008) posit that overconfident CEOs hold the belief that they are better equipped to manage a particular target than the existing management and, consequently, seek to generate excessive returns through the M&A of firms and their replacement with a new management structure. Nevertheless, a number of research indicates that such belief results in firms paying a premium price for target firms and exhibiting negative M&A performance (Hayward & Hambrick, 1997; Roll, 1986). Likewise, this study suggests that TMT overconfidence plays a significant contingency role in explaining biased behavior of TMT in the context of the digitalization focus and M&A activities.

The process of digitalization has the effect of enhancing a firm's ability to gather and analyze data. This, in turn, has the beneficial consequence of improving decision-making processes and reducing information asymmetry in potential M&A transactions. The digital transformation process, by offering data-driven insights, facilitates a more effective identification of potential acquisition targets and the realization of synergies, which should lead to an increase in M&A activity. Nevertheless, the cognitive bias of overconfidence among TMTs may act as a moderating factor in this relationship. TMTs who are overconfident often display an exaggerated confidence in their own judgment, overestimating their capacity to make decisions without relying extensively on external data. Such a bias may result in a tendency to distrust or undervalue insights generated through digitalization. That is, overconfident CEOs are highly likely to prefer to make decisions based on their subjective intuition rather than on the results of digitalization's information gathering and analysis, which can lead to underutilization of advanced digital tools and, as a result, undermine the positive impact digitalization can contribute to M&A. Consequently, even when digital tools provide robust evidence supporting M&A opportunities, such TMTs may remain skeptical of the projected outcomes or synergies, thereby reducing the likelihood of acting on these insights. It is important to note that this moderating effect of TMT overconfidence does not necessarily indicate a preference for internal growth over external acquisitions. Nor does it imply a total avoidance of M&A. Rather, it suggests that overconfident TMTs may exhibit a reluctance

to fully embrace or trust the outcomes derived from digitalized information. As a result, they may downplay or disregard M&A opportunities that are identified through digital transformation. This ultimately weakens the positive effect of digitalization on M&A activity. Based on the above we suggest that:

H2: TMT overconfidence negatively moderates the relationship between digitalization focus and M&A investments such that the positive relationship between digitalization focus and M&A investments will be weakened.

3. Methodology

3.1. Sample

This study's sample consists of U.S. manufacturing firms that are required to file 10-K reports with the U.S. Securities and Exchange Commission (SEC). The sample period covers 1994 to 2015. The 10-K report is a comprehensive annual document that outlines a company's financial health, business strategies, and overall operations. It serves as a critical source of information, reflecting the company's responses and adaptations to environmental changes (D'Aveni & MacMillan, 1990). The 10-K reports were obtained from the SEC's EDGAR PRO database, with the Management's Discussion and Analysis (MD&A) sections extracted for text analysis. Financial data for the firms were gathered from the S&P Compustat database. M&A deals were identified through the SDC Platinum Mergers & Acquisitions database provided by Thomson Financial. To maintain sample homogeneity, only companies in the manufacturing sector (SIC codes 2000-3999) were included. Table 1 reports the industry distribution of the sample. Cases with unmatched company codes, names, or missing data during the integration of the databases were excluded. The final sample comprises 7,773 observations, representing 956 firms, forming a panel dataset.

A key focus of this study is the MD&A section of the 10-K report, which offers management's perspective on the company's business operations, strategic initiatives, and financial outcomes. This section includes vital information on financial performance, major business challenges, strategies, and future goals, making it highly valuable for investors. It reflects management's insights on recent performance and key issues, providing a deeper understanding of the firm's strategic direction. The language used in the MD&A is analyzed to capture the unconscious psychological traits of top management, following the framework

Table 1: Industry Distribution of the Sample

SIC 2-digit	Industry	Total (%)
20	Food and Kindred Products	379 (4.88)
21	Tobacco Products	33 (0.42)
22	Textile Mill Products	50 (0.64)
23	Apparel, Finished Products from Fabrics & Similar Materials	153 (1.97)
24	Lumber and Wood Products, Except Furniture	98 (1.26)
25	Furniture and Fixtures	112 (1.44)
26	Paper and Allied Products	217 (2.79)
27	Printing, Publishing and Allied Industries	179 (2.30)
28	Chemicals and Allied Products	1,236 (15.90)
29	Petroleum Refining and Related Industries	108 (1.39)
30	Rubber and Miscellaneous Plastic Products	19-(2.32)
31	Leather and Leather Products	93 (1.20)
32	Stone, Clay, Glass, and Concrete Products	133 (1.71)
33	Primary Metal Industries	283 (3.64)
34	Fabricated Metal Products	237 (3.05)
353	Industrial and Commercial Machinery and Computer Equipment	1,088 (14.00)
36	Electronic & Other Electrical Equipment & Components	1,443 (18.56)
37	Transportation Equipment	478 (6.15)
38	Measuring, Photographic, Medical, & Optical Goods, & Clocks	1,112 (14.31)
39	Miscellaneous Manufacturing Industries	161 (2.07)
Total		7,773 (100)

of Pennebaker and King (1999), which posits that linguistic expressions can reveal underlying attitudes and cognitive biases. By analyzing the MD&A text, this study seeks to understand the cognitive structures and valuesof top executives and their impact on key corporate outcomes, such as M&A investment. Previous research in leadership suggests that the language of top executives, such as CEOs, can offer insights into their leadership styles, values, and decision-making processes (Klenke, 2016). Content analysis of the themes and narratives within the MD&A provides a window into the cognitive and emotional characteristics of leadership (Miles & Humberman, 1994), allowing us to study the values, meanings, and emotions conveyed through managerial language and their potential influence on firm strategy.

3.2. Variables

For the dependent variable, we construct *M&A Investment* to capture firms' engagement in M&A activities. We use two types of measures: (1) the number of M&A announcements made during the year, and (2) a dummy variable indicating whether an M&A announcement was made. While M&A investment can be measured by deal size or completion, the number of announcements better reflects a firm's proactive attempts to engage in strategic M&A activities.

Digitalization Focus, the independent variable, measures how much a firm is concentrating on digital resources. Following the methodology of Bhandari et al. (2023), we use a text analysis approach to calculate the normalized ratio of digitalization-related word count to the total number of words in the firm's 10-K report. As Bhandari et al. (2023) suggest, this measure provides a more comprehensive view of the TMT's focus on developing digital capabilities, rather than solely focusing on IT investment sizes.

For the moderating variable, we construct *Overconfidence*, capturing TMT cognition related to positive biases. This variable measures the extent to which the TMT expresses positivity in its communications beyond what is justified by financial performance (measured by ROA). We adopt the methodology of Kang et al. (2018) to identify abnormal tones and measure *Overconfidence*. According to Kang et al. (2018), an increase in the positive tone of text should align with improvements in the firm's performance. However, any unexplained, abnormal positivity may indicate cognitive biases such as overconfidence. To construct the *Overconfidence* variable, we perform a firm-year fixed effect linear regression between net positive tone and ROA, controlling for firm size. The residuals from this model, which reflect any abnormal positive tone, serve as the basis for measuring *Overconfidence*. Positive residuals indicate an abnormal tone, suggesting overconfidence.

Several control variables closely related to M&A activities are included. *Firm Size* is measured as the natural logarithm of total assets, and *Debt Ratio* represents the total debt divided by total assets. *BM Ratio* refers to the book-to-market ratio, while *ROA* is the ratio of net income to total assets. *Liquidity Ratio* is calculated as the ratio of cash and marketable securities to total liabilities (Greve, 2003). *R&D Intensity* is the ratio of R&D expenditure to sales, and The *CEO Chair* variable is a dummy that takes the value of 1 if the CEO also serves as the chairman of the board, and 0 otherwise, controlling for the potential influence of a powerful CEO on TMT decisions, including M&A strategies. *Total Word* is the log-transformed total number of words in the 10-K report, indicating its length.

Table 2: Word Lists

Variable	Definition	Representative Word List	References
Digitalization Focus	The level of digitalization. Measurement: digitalization related words divided by total words	Digitalization: digital*, internet, internet-of-things, internet of things, IoT, remote, Industry 4.0, smart solution, smart product, autom*, data*, monit*, information technology, tech*, information system, syst*, IT, advanced, manuf*, telemati*, artificial intelligence, AI, intelli*, machine learning, learn*, and robot*.	Bhandari et al. (2023)
TMT Overconfidence	TMT's overconfidence compared to financial performance. Measurement: residuals of the positive tone variable in a regression with ROA as an independent variable	Positive tone: accept, accepta*, advantage*, agree, agreeable, confidence, confident, ease*, excel, favor, good, great, hope, incentive*, interest, positive, positively, profit*, proud, special, success, useful, value, valued	Kang et al. (2018)

Table 3 reports the mean, standard deviation, and correlation values of the variables. In addition, we calculated variance inflation factors (VIFs) to check for multicollinearity. All VIF values are within the range of 1.25-7.49, confirming that there was no multicollinearity problem among the variables.

Table 3: Descriptive Statistics and Correlations

	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. M&A Investment	0.89	1.33										
2. Digital Focus	0.92	0.47	0.02									
3. Overconfidence	-0.04	0.64	0.03*	-0.06*								
4. Firm Size	7.21	1.54	0.29*	0.01	-0.05*							
5. ROA	0.04	0.14	0.08*	-0.02	0.08*	0.13*						
6. Debt Ratio	0.47	0.23	0.05*	-0.03*	0.00	0.40*	-0.08*					
7. Liquidity Ratio	0.51	0.99	-0.07*	0.02	-0.04*	-0.28*	0.03*	-0.47*				
8. BM Ratio	0.48	0.46	-0.06*	-0.01	-0.09*	-0.12*	-0.20*	-0.17*	0.00			
9. R&D Intensity	0.09	0.26	-0.03*	0.03*	0.03*	-0.12*	-0.27*	-0.09*	0.11*	-0.07*		
10. CEO Chair	0.51	0.50	0.01	-0.17*	0.03*	0.00	-0.03*	0.04*	-0.01	-0.01	0.03*	
11. Total Word	8.65	1.68	0.01	0.04*	0.00	0.20*	0.06*	0.15*	-0.10*	-0.06*	-0.11*	-0.04*

Note: * p <0.05

4. Empirical Results

The research model is tested using a panel linear regression, with the number of M&A announcements as the dependent variable (Table 4). We employed firm-level fixed effects as the Hausman test results indicated significance below the 5% threshold, supporting the use of fixed effects. In Models 2 and 3 of Table 4, Digitalization Focus is positively associated with M&A investment (β=0.111, p<0.01; β=0.102, p<0.01), supporting Hypothesis 1.

Table 4: Results of the Panel Regression Analysis

	Model 1	Model 2	Model 3
Digitalization Focus		.111* (0.056)	.102* (0.049)
Overconfidence			.352*** (0.082)
Digitalization Focus x Overconfidence			-.161* (0.075)
Firm Size	.444*** (0.040)	.462*** (0.041)	.453*** (0.040)
ROA	.486** (0.175)	.484** (0.172)	.442** (0.152)
Debt Ratio	-.154 (0.147)	-.149 (0.146)	-.118 (0.143)
Liquidity Ratio	-.031+ (0.016)	-.030+ (0.016)	-.028+ (0.016)
BM Ratio	-.068* (0.032)	-.067* (0.032)	-.049 (0.030)
R&D Intensity	.068 (0.087)	.069 (0.085)	.076 (0.084)
CEO Chair	-.075+ (0.043)	-.077+ (0.043)	-.075+ (0.043)
Total Words	-.009 (0.012)	-.006 (0.012)	-.005 (0.012)
Firm Fixed Effect	Yes	Yes	Yes
Constant	-2.099*** (0.302)	-2.361*** (0.335)	-2.309*** (0.325)
Observations	7,773	7,773	7,773
Number of id	956	956	956
R-squared	0.03	0.04	0.04
F-value	19.60	17.69	17.90

Note: Robust standard errorss in parentheses, + p<0.10; *p<0.05; ** p<0.01; *** p<0.001

Additionally, Model 3 shows TMT Overconfidence positively affects M&A strategies (β=0.352, p<0.001), but negatively moderates e relationship between Digitalization Focus and M&A investment (β=-0.161, p<0.01). This finding supports Hypothesis 2, indicating that overconfident TMTs are less likely to engage in proactive investments, such as M&A, when supporting the company's digitalization efforts.

To further examine the impact of *Digitalization Focus* and *Overconfidence* on M&A investment, we employed a panel logit model with an M&A announcement dummy as the dependent variable (Table 5). While Table 4 demonstrates the effect of *Digitalization Focu*s and *Overconfidence* on the level of M&A investment in a given year, Table 5 illustrates whether these variables influence the likelihood of engaging in M&A activity.

In Models 2 and 3, *Digitalization Focus* significantly increases the likelihood of an M&A announcement (β= 0.369, p<0.001; β= 0.325, p < 0.001), supporting Hypothesis 1. *Overconfidence* also positively influences M&A engagement (β=0.657, p<0.01). However, Model 3 reveals a significant negative moderating effect of *Overconfidence* (β=-0.276, p<0.01), indicating that overconfident TMTs reduce the impact of *Digitalization Focus* on M&A activity, thus supporting Hypothesis 2.

In summary, the empirical results from Tables 4 and 5 suggest that while *Digitalization Focus* increases both the engagement in and intensity of M&A investment, overconfident TMTs are less likely to utilize M&A as a strategy to support a firm's digitalization efforts.

To better understand the moderating effect of overconfident TMT, we estimated the marginal effects using the panel regression model, as illustrated in Figure 2. A positive value of the Overconfidence variable indicates that the TMT is expressing a higher positive tone than warranted by actual financial performance, while a negative value reflects insufficient positive tone relative to financial performance. Based on this, we categorize the TMT into overconfident (with a positive Overconfidence variable) and

underconfident (with a negative Overconfidence variable) groups. Figure 2 shows that while overconfident TMTs with a stronger digitalization focus exhibit a slight increase in M&A investment, underconfident TMTs with a higher digitalization focus significantly increase their M&A investment. This result also supports Hypothesis 2.

Table 5: Results of the Logit Regression Analysis

	Model 1	Model 2	Model 3
Digitalization Focus		.369*** (0.092)	.325*** (0.091)
Overconfidence			.657*** (0.120)
Digitalization Focus x Overconfidence			-.276* (0.107)
Firm Size	.361*** (0.058)	.423*** (0.061)	.408*** (0.060)
ROA	.897** (0.298)	.874** (0.294)	.709** (0.258)
Debt Ratio	-.821** (0.258)	-.819** (0.258)	-.760** (0.257)
Liquidity Ratio	-.082* (0.041)	-.080+ (0.041)	-.075+ (0.041)
BM Ratio	.035 (0.082)	.040 (0.081)	.080 (0.080)
R&D Intensity	-.001 (0.207)	.013 (0.208)	-.006 (0.210)
CEO Chair	-.048 (0.075)	-.059 (0.075)	-.046 (0.076)
Total Words	-.059** (0.020)	-.050* (0.020)	-.054** (0.020)
Firm Fixed Effect	Yes	Yes	Yes
Observations	7,077	7,077	7,077
Number of id	736	736	736
Pseudo R-squared	0.01	0.01	0.02
Chi-squared	76.18	93.47	147.97

Note: Robust standard errors in parentheses, + p <0.10; * p <0.05; ** p <0.01; *** p <0.001

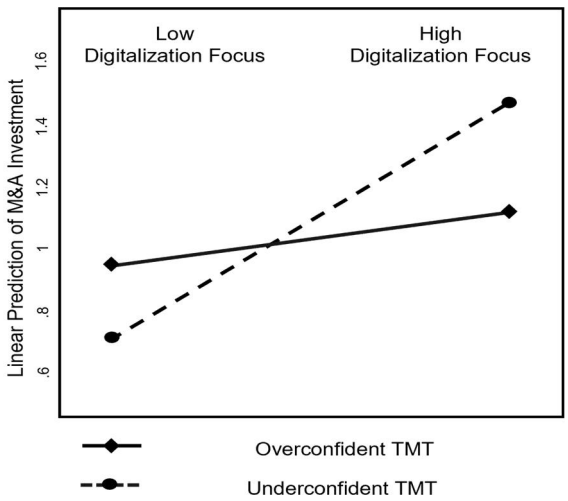

Figure 2: Moderation of Overconfidence

5. Discussions and Conclusions

5.1. Implications

The findings of this study provide several key insights into the relationship between digitalization, TMT's cognitive characteristic, i.e., overconfidence, and M&A investment strategies. First, our analysis demonstrates that a TMT with a higher digitalization focus significantly increases both the likelihood of M&A engagement and the intensity of M&A investment. This result emphasizes the role of digitalization as a driver of proactive strategic investments like M&A. Firms that prioritize digital resources appear to view M&A as a critical mechanism for expanding or enhancing their digital capabilities.

Second, the study suggests that TMT's overconfidence has a dual effect. While overconfident TMTs are more likely to engage in M&A, they tend to moderate the influence of digitalization focus negatively. This finding suggests that overconfident TMTs, while optimistic about the firm's prospects, are less inclined to leverage M&A to support digital transformation efforts. These results align with the cognitive bias theory, where overconfident managers may downplay risks or overestimate their firm's ability to develop digital resources internally, thereby reducing their reliance on external M&A opportunities.

The implications of these findings are multifaceted. For practitioners, understanding the nuanced role of overconfidence in strategic decision-making is critical. Firms with overconfident TMTs may need to implement proper governance structures or decision-making checks that reduces managerial biases and encourage more balanced strategies, especially when it comes to supporting digital transformation through external investments like M&A. Specifically, companies should establish independent review boards or committees that objectively assess proposed M&A activities. This can help ensure that decisions are based on sound evidence and not solely on managers' intuition. Additionally, requiring TMTs to provide thorough, data-driven justifications for critical strategic decisions can encourage the use of objective information and offset overconfidence. By adopting these measures, organizations can promote more balanced and adequate decision-making in their M&A strategy. Furthermore, these findings contribute to the academic literature on strategic management and M&A by highlighting the importance of managerial cognition in shaping firm strategies. The results suggest that TMT overconfidence can serve as both a catalyst for and a deterrent to strategic investments, depending on the context of the firm's broader goals.

5.2. Limitations and Future Research

While this study provides valuable insights into the moderating role of TMT overconfidence in the relationship between digitalization focus and M&A investment, it also has several limitations. First, the measurement of overconfidence relies on textual analysis, specifically abnormal positive tones in 10-K reports, following the methodology of Kang et al. (2018). Although text analysis is a well-established method for assessing the tone and sentiment of managerial communications, it may not fully capture the psychological traits of TMT members, such as overconfidence, due to the potential influence of strategic messaging tailored for external stakeholders, such as investors and analysts. Although we follow Kang et al. (2018) by using a regression approach to control for firm performance (ROA) and isolate abnormal positive tone as an indicator of cognitive bias, this measure remains an indirect proxy for overconfidence. Future research could improve the reliability of this measure by complementing textual analysis with additional data sources, such as behavioral indicators or direct surveys, to provide a more comprehensive view of TMT psychological traits. This multi-method approach could deepen insights into how cognitive biases influence strategic decisions, particularly in contexts where text-based assessments may be influenced by external stakeholder considerations. Extending these methods would help to test the applicability of our findings to other settings and improve the robustness of overconfidence as a measure in M&A research.

Second, our analysis only examines the M&A announcements as the dependent variable, without considering the quality or long-term outcomes of these M&A deals. The success or failure of M&A deals is critical in evaluating the effectiveness of managerial decisions. Future research may explore the relationship between TMT overconfidence and the actual performance of M&A deals, providing a more comprehensive view including long-term firm outcomes.

Third, despite its contributions, this study has certain limitations. Since our research focused only on manufacturing firms to examine the effect of digitalization on M&A investments, it fails to capture the impact of digitalization on distribution channels and supply chain management in the M&A process. Therefore, future research should consider research settings which allow to investigate the distribution effects of digitalization in the process of M&As. For example, by examining service or distribution industries, future studies can analyze the relationship between the level of digitalization and M&A activities. It enhances understanding how digital transformation contributes to the M&A process from a distribution perspective.

Lastly, while this study provides valuable insights into the moderating role of TMT overconfidence in the relationship between digitization focus and M&A investment, it is limited to U.S. manufacturing firms that file 10-K reports. This industry was selected because of its frequent involvement in M&A activities, making it particularly well suited to examine the impact of digitalization on strategic investment decisions. However, we acknowledge that this industry and geographic focus may limit the generalizability of our findings to other sectors or regions. Future research could extend this study by investigating whether similar relationships exist in different industries or in an international context, which would help to test the applicability of our findings more broadly.

In conclusion, this study underscores the importance of considering both external factors (such as digitalization focus) and internal managerial traits (such as overconfidence) when examining M&A strategies. As digital transformation continues to reshape markets and industries, the ability of firms to navigate these shifts through strategic M&A will increasingly depend on the cognitive and behavioral traits of their top management teams.

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