

# Mergers and Acquisitions Strategies for Industry Leaders, Challengers, and Niche Players: Interaction Effects of Technology Positioning and Industrial Environment

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**Abstract**—This study empirically investigates the merger and acquisition (M&A) strategies of focal firms by considering their market and technology position at the industry level. The results obtained using patents, firm M&A agreements, and the financial data of U.S. technology firms from 1997 through 2008 demonstrate how industry leaders, challengers, and niche players differ in their M&A strategic logic. Three industry environmental factors and two technology positioning factors exhibit different effects on firms' M&A strategies for varied market positions. The overall patterns reveal that niche players are more aggressive in leveraging their technology positions to adopt M&As for the purpose of acquiring access to external knowledge resources, while leaders tend to leverage their market positions and use M&As to further strengthen their market power. Challengers are more likely to engage in M&As when locating in unfavorable environmental markets, but they are less likely to engage in M&As when locating in technologically crowded areas.

**Index Terms**—Industry challenger, industry environment, industry leader, market position, mergers and acquisitions (M&As), niche player, technological positioning.

## I. INTRODUCTION

**M**ERGERS and acquisitions (M&As) have quickly become a leading means for global companies to achieve and maintain their competitive advantage. Recent company investments in heavy M&A activities primarily for company growth have reached unprecedented levels worldwide [23]. Existing studies support the premise that M&As increase firm market power [15], increase efficiency [1], and extend resources into new areas [31]. Previous findings have implicitly assumed that firms have similar aptitudes for M&A action strategies. However, players differ in their M&A arrangements and strategies, causing firms to consider numerous affected factors, such as

industry environmental conditions, market position, and technological positioning. Whereas studies have emphasized the antecedents that lead firms to undertake acquisitions, internal and external factors also influence acquisition performance and other acquisition outcomes [28]. Empirical studies that address the influential factors of M&As on the industry environment and on technological positioning are scant. Thus, this paper examines how market position and technological positioning influence the M&A activities of firms. This research also considers how industry leaders, challengers, and niche players differ in their M&A arrangements.

Because of the increasing number of firms in high-technology sectors that have successfully adopted M&A strategies, it is essential to investigate M&A strategies at both the industry and firm levels. However, the dominant paradigm for competitive analysis emphasizes using and exploiting scarce and valuable knowledge resources at the product market level of analysis. Studies focusing on the strategic dissimilarities and similarities among rivals are still lacking [57]. Firms may play different roles and adopt distinct M&A strategies according to their technological positioning and their own market environmental contexts. Both the resource-based view (RBV) and market position analysis share a common concern that M&A strategies for firms within the same industry should differ. Because technological and market relatedness conditions may have a measurable effect on M&As in the integration process, individual firms typically integrate with business partners and position themselves in industry networks to respond to external environments and to leverage their strengths of internal capabilities and market power.

Despite the growing interest in competition strategy, researchers have devoted little effort to investigating how leaders and followers differ in their strategic behaviors. This paper identifies numerous significant patterns in how industry leaders, challengers, and other niche players develop their M&A strategies. The main contributions of this paper are as follows. First, this research empirically investigates the M&A strategies of focal firms by considering their market position and their technological positioning at the industry level. Second, it shows that three industry environmental factors and two technology positioning factors exhibit very different effects on firms' M&A strategies for different market positions. Further, this study demonstrates how industry leaders, challengers, and niche players differ in their M&A strategic logic. The remainder of this

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research is structured as follows. First, a brief literature review on the market position and technological positioning strategies of M&As is presented. Four hypotheses on competitive strategies developed from market position and technological positioning are then presented, followed by a description of the empirical research design, the data analysis, and the results. Finally, the strategic implications are discussed, and certain recommendations for competitive strategies in the industry environment are offered.

## II. RESEARCH BACKGROUND AND HYPOTHESES

M&As have recently become a common phenomenon. A critical review of existing studies showed that firms undertake M&As to increase firm market power [15] and efficiency [1] and extend resources into new areas [31]. Companies are forming open innovation networks to take advantage of external technology sources gained through M&As [27], [59]. Therefore, the RBV has been adopted to account for the logic behind M&A behaviors. A knowledge-based view (KBV) of firms extends the resource-based theory regarding the ability of a firm to integrate external sources. Certain studies have shown that environmental uncertainty and technological positions affect firms that adopt other cooperative strategies. Both the technological and market-share positions of firms should be considered simultaneously to understand why and how firms in various competitive positions employ diverse strategies [21]. Therefore, these interacting factors warrant assessment.

This paper introduces a new theoretical framework of M&As based on a literature review. According to previous research, this study discusses M&As involving consideration of market position, technological positioning strategies, environmental factors, the RBV, and the KBV. Furthermore, this research involved developing four hypotheses to explain how industry players differ in M&A behaviors based on market position. Moreover, this study examined the interaction effects of the industrial environment and technological position.

### A. M&A Strategies: Technological Positions and Industry Environment

In several academic fields, studies have focused on the strategic and financial decisions involved in acquisition actions. Numerous scholars have focused their research on whether mergers add value to a firm. These scholars have aimed to understand the relationship between M&As and firm performance by studying the changes in shareholder value [55]. In researching the effects of acquisitions on performance, researchers have focused primarily on the reasons firms decide to acquire. Whereas various reasons exist for firm acquisitions, they can be classified into four categories: value creation, managerial self-interest (value destruction), environmental factors, and firm characteristics [28].

Acquirers not only deeply strengthen resources in existing areas, but also extend resources to new areas. Ever-increasing costs, the speed to market, and complex technological innovations in high-tech industries dwarf internal research and development (R&D) efforts and the technological resources of individual firms. Therefore, firms can shape an open innovation

network to gain external sources of technology through M&As [27], [59]. Strategic management scholars have also examined the relationship between the motives of firm acquirers and industry environmental situations. Schilling and Steensma [32] report that environmental uncertainty broadened the likelihood of acquisition over license, although Folta [49] indicates that environmental uncertainty increased the likelihood of collaboration over acquisition. Further works have explored how environmental circumstances influence corporate acquisition possibilities. When examining environmental situations, scholars have found evidence of the influence of external governance structures on acquisition likelihood.

Corporations adopt M&A strategies to strengthen and maintain their market positions in the marketplace. The technology positions and intentions of firms may also influence their acquisition behaviors. Managers may use acquisitions as a means of innovation because they allow managers to approach new industry scopes by broadening their existing resources. Resource-based and organizational learning perspectives [31] posit that offline firms used acquisitions to obtain positive returns by acquiring scarce resources from Internet organizations. By integrating innovation-oriented resources or leveraging innovative capabilities, acquiring firms can leverage the innovation resources of target firms [42]. Therefore, this work treats M&As as a major mode in a portfolio of interfirm relationships. This paper focuses on what constitutes the driving forces of acquisition activity using external technology sourcing.

The RBV focuses on the distinctive valuable resources of an individual firm, whereas the market position analysis emphasizes the unique market positions of a focal firm. Stuart [29] used the concept of technological positioning to show relative technology resources and capabilities that influence whether, when, and to what extent firms have opportunities to form beneficial strategic relationships. Hoffmann and Schaper-Rinkel [58] suggested that three categories of factors—environmental characteristics, transactional characteristics, and company characteristics—influenced choosing between alternative acquisition modes and cooperative strategies. To improve understanding of M&A strategies at the firm level requires an integrative framework that accounts for firm market position, technological positioning, and industry environment.

### B. Market Positions: Leaders, Challengers, and Other Niche Players

Industry organization theorists study market structure, firm strategic behavior, and firm interactions. The seemingly different patterns of competitive strategies that industry leaders, challengers, and other players adopt to fit their market positions and knowledge resources are intriguing phenomenon that have attracted the attention of both academia and parishioners [21], [53]. The concepts of market positioning strategies for players of various market positions that Kotler [41] and Porter [34] employed have become popular teaching materials for market and strategy management courses. Competitive strategies differ among firms according to their competitive market positions. This line of research assumes that firms should have different strategies according to their market share positions.

Industry leaders, challengers, and small-share firms are three types of market positions commonly used to describe how firm strategic options differ. The three types of positioning strategy roles—industry leader, market challenger, and small-share players—collectively shape the competitive stage in a concentrated industry. The term “industry leader” refers to the firm with the largest market share in a given industry. The industry leader typically leads other firms in price changes, new product introductions, marketing spending, and other strategic moves. Businesses enjoying a large market share are more assumed to be more profitable than those with a small market share [44]. The term “market challenger” refers to a firm with a high, but not dominant, market position. The market challenger often adopts an aggressive strategy of trying to defeat the industry leader. The niche player is generally a small firm who does not compete with the large firms but rather focus on a niche market. Their products/services are focused to meet specific demand of customers that are not met by the mainstream market.

### C. Hypotheses

M&As have begun to constitute a powerful strategic weapon for market leaders to leverage their positional advantages. Industry leaders should have responsive competing strategies to defend against competitor attacks [38] and must be able to create industry conditions that allow them to enjoy substantial benefits to attain and maintain a dominant status. M&As refer to interfirm linkages that lead to integrating two entities into a single ownership entity [59]. Acquisitions result in operating synergies that occur when two operating units under a single ownership entity work together more efficiently or effectively than apart [36]. The underlying logic behind M&As is that the combined entity should be able to realize cost savings resulting from economies of scale. Acquiring competing firms to improve market position among other competitors reduces competition pressure. Therefore, when facing increasing competitive pressure, industry leaders tend to make acquisitions within their industries to create economies of scale or across industries to gain economies of scope [4].

M&As are one of the alternatives leading firms to exploit external sources of innovative competencies to protect their core businesses [27]. Industry leaders in the high-tech sector often make acquisitions to defend the customer base and create scale advantages in R&D and marketing. Significant and substantial productivity gains typically follow acquisitions. For example, Samsung, the world’s largest mobile-phone maker, began buying technologies and investing in companies in 2012. Samsung’s Cochief Executive J.K. Shin has stated that the company is seeking acquisitions to access resources, including intellectual property, advanced technology, and components, to enable the firm to provide enhanced applications for smartphones. With funds of more than US\$30 billion, Samsung is likely to continue buying. Previous deals have facilitated access to technology that enabled developing a more sophisticated stylus for smartphones, advanced wireless connectivity, and software that enables faster data transfer for phones [35]. Scope acquisitions

enable an industry leader to broaden a firm’s market coverage, increase dependence on its customers and suppliers, and leverage core resources such as knowledge and reputation. Therefore, the following hypothesis is proposed.

*Hypothesis 1:* Industry leaders are more likely to engage in M&A activities than are other firms in the same industry.

Two main perspectives have emerged to explain how firms create and maintain sustainable competitive advantage; one stresses environmental context, and the other emphasizes technological positioning [34]. Environmental uncertainty poses a main problem for firms deploying their resources [26]. For improving firms’ decision making and the management of uncertainty and complexity, technological learning processes are the organizational transformation process. It is that organization combines with both extrinsic and intrinsic motivation [13]. In this view, technological learning enables an organization to pursue a greater range of technology-based strategies and activities [14]. For these reasons, the environmental context perspective begins by considering the market position of a firm in its industry, and then, proceeds to devise strategies that assemble the requisite resources for competition.

Because leaders and challengers occupy asymmetric market positions and are diversely affected by industry environments, they are expected to possess different M&A strategies when responding to environmental conditions. When industry environments are unfavorable, industry leaders tend to adopt strategies to maintain the status quo. Excellent past performance records contribute to competitive inertia and a lack of aggressive action [10]. Using seven years of data collected from 41 industries, Ferrier, Smith, and Grimm [57] founded that when compared with challengers, industry leaders are less competitively aggressive, use simpler strategy repertoires, respond more slowly to competitive actions, and are thus, more likely to experience market share erosion.

Firms that are located in unfavorable market positions tend to pursue diversification through M&As [22]. Although challengers may be affected by more negative effects than industry leaders are because they lack resources when facing market downturns or unfavorable industrial environments, this is an opportune time for challengers to capture a dominant subsegment of the market abandoned by industry leaders rather than fight with such leaders [18]. A strategic goal of challenger firms is to become the industry leader because industry leader experience greater profit by exploiting economies of scale and market power, gaining reputational advantage, and being first movers [44], [57]. From the market point of view, market share reflects sales volume. This translates into “the bigger, the better.” Thus, challengers can be aggressive, but can only act to a certain extent regarding market share competition, because leading companies control market standards and dominate mainstream markets. Challengers can purchase smaller local companies to extend their sales volume, and thereby, avoid fighting directly with market leaders. Therefore, this study asserts that challengers may be more aggressive in M&A strategies to gain market share when the industrial environment is disadvantageous. Accordingly, this paper offers the following hypothesis.



*Hypothesis 2:* Industry challengers are more likely to increase their M&A activities than are industry leaders when facing unfavorable environmental conditions.

According to the RBV, technological capabilities are crucial for sustaining a firm's competitive advantage. Firms can increase their competitive advantage by unique technology capabilities and well-known technology prestige. Many studies indicate knowledge and technological capabilities as important for developing competitive advantage [5], [25], [45]. These technological capabilities include technological knowledge, patents protected by law, and production techniques that are valuable and difficult for competitors to counterfeit. Complementary assets also play a critical role in sustainable competitive advantage and innovation from the resource-based perspective. Because these resources are valuable and difficult to imitate, they become a root of competitive advantage [25]. Acquirers gain excessive returns from target firm complementary resources [11]. Expanding on the RBV of firms, Teece *et al.* [12] analyzed strategic resources, capabilities, and competencies to explore the possibility of a theory of "dynamic capabilities." Learning plays the central role in building new competencies [2]. Organizational learning is "a process by which repetition and experimentation enable tasks to be performed better and quicker and new production opportunities" to improve the firm performance [12] and leads to new strategic capabilities [14]. To extend the RBV, the KBV of the firm [46] underscores the ability of a firm to integrate external sources. Hence, the more knowledge and technological capabilities that firms acquire, the greater the technological prestige they accrue.

Niche players extend firm technological capabilities and accumulate firm technological prestige in small segments that other firms in the industry often overlook or ignore. Niche players are often small firms with limited resources that must avoid direct competition with large market players. The niche market is most profitable when it is large enough to sustain growth, but small enough that it does not look attractive to larger market players. Moore [18] called this period "The Bowling Alley" because it is a niche-based adoption stage that precedes advancing to the general marketplace. This position helps a firm cross the chasm, and can be viewed as the "head pin" because it can be leveraged to penetrate other closely related niche markets [19]. The beachhead is a solid position that provides a base for further firm advancement. If niche-to-niche movements are controlled, the niche market may mature and form a new mainstream market. When this occurs, disruptive innovation begins to be understood, and the marketplace shifts to adopt a new paradigm, referred to as the "tornado" [18]. Ultimately, successful niche players pin the original market leaders in the highest tiers of the new market.

It is imperative for niche players to use external resources and acquire complementary assets because they own fewer resources than industry leaders. To improve their competition with industry leaders, niche players must be technologically prestigious to convince potential partners that they can creatively destroy the current market structure. Niche players accumulate technological capabilities from the current niche market, and subsequently, penetrate another market to obtain external knowledge and resources. A firm that accumulates a higher level of technological assets tends to be more profitable than those that do not. Firms

with high technology prestige pursue nonsynergistic acquisitions to grow rapidly and to simultaneously maintain sustained returns. Therefore, the following hypothesis is proposed.

*Hypothesis 3:* Industry niche players are more likely to leverage their technology prestige in M&A activities than are industry leaders.

Technological crowding is one of the organization-specific means to measure competitor density [29] and reflects the degree to which the patent portfolio of a firm overlaps with those of numerous other organizations [50]. If organizations occupy several technological areas that numerous competitors are pursuing, they are in technologically crowded positions. Thus, competitive intensity is a density influence among industry players in certain resource spaces [33]. Competitive intensity occurs frequently in mature product markets or technological markets. An industry that becomes more mature shows that all competitors are in crowded technological areas, that market expansion is decreasing, and that technology competition is intensely increasing. During this stage, firms should capture and defend market shares by exerting great competitive pressures. The technological learning effectively would contribute to competitive advantage by expanding technology-based strategic action, and selecting the most appropriate strategy for the firm's competitive environment [13]. Therefore, firms tend to possess unique specific knowledge [45], which increases their competitive advantage in mature industries.

It is difficult for market challengers to decrease environmental competition through M&As in a mature industry. By contrast, industry leaders that possess product standard advantages and unique technology can adopt M&A strategies to reduce industry competitiveness and maintain their market position. In this environment, the competitive advantage is not only based on whether a firm is able to learn, but also how effectively it can recognize and exploit learning opportunities created by aligning its internal capabilities with the external technology-intensive environment [14]. Therefore, market challengers might adopt cooperative [50] and innovative strategies [54] and avoid M&A activities in technology-intensive industries. Although industry leaders have more resources to develop unique competitive strategies and enjoy higher price premiums for their higher-quality products than smaller-share firms [44], market challengers can compete with dominant firms through innovative strategies that depend on market and technology characteristics.

Businesses usually replaced M&A activities with other strategies in heavily competitive markets. Stuart [50] indicated that the rate of forming technology development and exchange alliances is higher when the level of firm technological crowding is greater. Challengers might also cooperate with other small-share players to promote radical innovation that could be more profitable for challengers than incremental innovation and make incompatible innovation more profitable than compatible innovation [54]. In conclusion, market challengers face higher levels of technologically competitive intensity resulting from lacking distinctive resources or the inability to utilize such resources. They can adopt innovation activities or collaborate with other companies to gain access to resources in technologically crowded areas. For these reasons, the following hypothesis is proposed.

*Hypothesis 4:* Industry challengers are less likely to engage in M&A activities than are industry leaders when competing in technologically crowded areas.

### III. RESEARCH METHODOLOGY

#### A. Sample of Firms and Industries

This study was designed to focus on how industry leaders, challengers, and niche players differ in their M&A strategic logic. Each industry must be defined in a manner that clearly identifies a particular set of firms that compete against each other by offering certain types of products to the same set of customers within well-defined industries [9]. Such interrelationships are likely to be captured at the four-digit Standard Industrial Classification (SIC) level, which defines industries based on product categories. To assess the effects of market position and technological positioning on M&A strategies implied in the competitive strategy and knowledge-based perspective, this study constructs a database to integrate the data from firm financial statements, patents, and M&A agreements from various data sources. The sample consists of U.S. technology firms with two-digit SIC Codes 35 (industrial and commercial machinery manufacturers) and 36 (electronic and other electrical equipment manufacturers). Intensive R&D investments and technology-related strategic initiatives characterize firm strategic behavior in these industries.

Because of data availability constraints, this study includes only publicly traded firms that received at least one patent during the observation period in the sample. Financial information for the sample firms was taken directly from the Compustat Research Insight Database. The M&A strategies of those firms were then gathered from the Securities Data Corporation (SDC) databases from January 1, 1994, to December 31, 2008. The SDC platinum database maintains a complete annual list of firm M&As, joint ventures, and alliances beginning in 1988 and has been widely used in previous strategy studies (see, e.g., [40]). A three-year observation window was employed to calculate focal firm M&A strategies and to capture the variation across years because the amount of strategic initiatives in one year may represent the long-term strategic intent of the focal firm.

The NBER Patent Citation Data File is a research database of U.S. patents granted from 1969 to 1999. The data file includes complete information from the front pages of all patents issued by the U.S. Patent and Trademark Office (USPTO). According to the data format and technology classification provided in this patent data file, this study extends the patent data file to include U.S. patent data from January 1, 2000, to December 31, 2008. A program was written to download patent data directly from the USPTO website. The patent information provided by the extended data file was incorporated and Microsoft Access was used as a research tool, together with firm CUSIP numbers, to integrate massive amounts of data from various sources.

#### B. Dependent Variables

Because of missing data in the Compustat Database, the final dataset included only 6137 firm-year data that were used for

subsequent Poisson regression analysis and hypotheses testing. The number of M&A agreements is a good indicator of firm strategic orientation. M&A agreements were used as dependent variables corresponding to the number of focal firm M&As announced during a three-year period. In our resulting dataset, the firms in a three-year period had M&As ranging from 0 to 80, with a mean of 1.87.

#### C. Independent Variables

Three industry environmental factors—munificence, volatility, and concentration—were introduced to control for possible environmental variations across industries. Environmental factors such as dynamism (see, e.g., [52]), environmental munificence, and competitive intensity (see, e.g., [47]) have been identified as determinants of the firm strategy and performance. Industry structure measured by concentration is the key determinant of corporate strategic behaviors and entry or exit decisions (see, e.g., [51]). Industry concentration measures the extent to which a few large firms dominate the sales of a given industry and represents the characteristics of competition. When facing uncertain environments, managers tend to be more proactive, take riskier strategic initiatives, and use more innovative options than do those in less volatile environments [16] as a means to anticipate the future and take advantage of possible opportunities rather than wait and see what will happen. Munificence refers to environmental support for firm growth and is measured as industry sales growth [20]. Volatility measures the uncertainty or instability of market demands and the relative market shares among competitors to be operationalized as the sum of squared market share changes for industry firms. Concentration is a factor that industry economists commonly use to measure industry effects on firm strategies [60]. In this paper, concentration is measured by the fraction of employees in the four largest firms [30]. Narin *et al.* [17] proposed using patent citation analysis as a viable approach to corporate technology capability assessment. Several empirical studies have used patents to indicate the inventive activity of a firm [3], [24]. Two patent-citation-based technological positioning indicators developed by Stuart [50], technological prestige and crowding, are adopted to measure focal firm relative technology standing among its competitors. To test the differences in M&A strategic logic among market leaders, challengers, and other niche players, this study introduces interaction terms between two dummy variables (challenger and niche player) and those of environment and technological positioning.

#### D. Control and Dummy Variables

Several control variables are employed to reduce possible variances to draw sample firms of different sizes and across the three-year observation period. The environmental conditions could vary every year. Eleven-year dummy variables, Y1997–Y2007, are introduced to account for possible variances caused by changes in yearly economic conditions. The relationship between firm size and innovation capability has long been a debated issue in the strategy literature (see [6]). Most empirical studies of firm performance include firm size as a

TABLE I  
DESCRIPTIVE STATISTICS AND CORRELATIONS

	Variable	Mean	S.D.	Min	Max	1	2	3	4	5	6	7	8
1	Munificence	10.51	9.13	-2.89	32.69	1.00							
2	Volatility (*100)	0.31	0.42	0.02	3.96	-0.27**	1.00						
3	Concentration	0.62	0.24	0.31	1.51	-0.63**	0.35**	1.00					
4	Technology Prestige (TP)	0.02	0.10	0.00	1.00	-0.15**	0.07**	0.16**	1.00				
5	Technology Crowding (TC)	0.23	0.42	0.00	4.25	0.19**	-0.10**	-0.28**	0.01	1.00			
6	Challenger	0.03	0.16	0.00	1.00	-0.10**	0.05**	0.12**	0.21**	-0.04**	1.00		
7	Niche Player	0.95	0.22	0.00	1.00	0.15**	-0.08**	-0.17**	-0.31**	0.40**	-0.70**	1.00	
8	Assets	2.03	1.07	-3.00	5.05	0.00	-0.04**	-0.07**	0.23**	0.21**	0.22**	-0.37**	1.00
9	M&As	1.87	4.29	0.00	80.00	-0.01	-0.01	0.00	0.19**	0.07**	0.16**	-0.40**	0.46**

Note: + $p < 0.10$ ; \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .  
 $N = 6,137$ .

TABLE II  
INTERACTION EFFECTS OF TECHNOLOGICAL POSITIONING AND INDUSTRY ENVIRONMENT MODEL, 1997–2008

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
Munificence	-0.054*	(0.024)	-0.053*	(0.023)	0.238***	(0.052)	0.199***	(0.051)	0.196***	(0.052)
Volatility	-0.007	(0.016)	-0.008	(0.016)	-0.145**	(0.046)	-0.132**	(0.043)	-0.135**	(0.044)
Concentration	0.019	(0.022)	0.007	(0.022)	0.051	(0.052)	-0.050	(0.055)	-0.021	(0.061)
Technology Prestige (TP)	-0.004	(0.010)	-0.011	(0.011)	-0.016	(0.011)	-0.103***	(0.021)	-0.109***	(0.023)
Technology crowding (TC)	0.042*	(0.017)	0.048**	(0.017)	0.048**	(0.017)	0.051**	(0.017)	0.119+	(0.071)
Challenger			-0.159*	(0.067)	-0.131+	(0.074)	-0.303***	(0.081)	-0.293***	(0.082)
Niche Player (NP)			-0.203***	(0.056)	-0.221***	(0.060)	-0.428***	(0.068)	-0.421***	(0.069)
Munificence*Challenger					-0.428***	(0.093)	-0.391***	(0.093)	-0.34***	(0.095)
Volatility*Challenger					0.200***	(0.055)	0.184**	(0.053)	0.188***	(0.054)
Concentration*Challenger					-0.226**	(0.087)	-0.128	(0.088)	-0.19*	(0.094)
Munificence*NP					-0.330***	(0.055)	-0.293***	(0.054)	-0.289***	(0.054)
Volatility*NP					0.145**	(0.049)	0.127**	(0.046)	0.130**	(0.046)
Concentration*NP					-0.026	(0.056)	0.062	(0.058)	0.035	(0.065)
TP*Challenger							0.083*	(0.033)	0.093**	(0.034)
TP* NP							0.149***	(0.026)	0.154***	(0.027)
TC*Challenger									-0.263*	(0.110)
TC* NP									-0.064	(0.072)
Assets	1.171***	(0.018)	1.128***	(0.022)	1.112***	(0.022)	1.089***	(0.022)	1.090***	(0.022)
Constant	-2.573***	(0.078)	-2.265***	(0.115)	-2.183***	0.116	-1.932***	(0.122)	-1.944***	(0.123)
Pearson Chi-Square	17608.83		17062.72		16557.01		16343.71		16371.65	
Number of firm years	6,137		6,137		6,137		6,137		6,137	

Note: \*\*\* $p < 0.001$ ; \*\* $p < 0.01$ ; \* $p < 0.05$ ; + $p < 0.1$ .  
Year effects controlled but not shown.

control variable or an independent variable. This tradition was followed in this paper, using total assets as a control for firm-size effect.

The SIC classification is a well-accepted classification system that is frequently used in industry organization research. This research adopted the concept of Ferrier, Smith, and Grimm [57] of market-share leaders in those industries defined by three-digit SIC codes. Four-digit SIC classification codes were initially used to define the type of market players to narrow the category scope. The results obtained using both the three- and four-digit SIC codes showed similar trends. Geroski and Toker [39] also used three-digit SIC codes to categorize manufacturing industries in Great Britain. Two dummy variables, challenger and niche players, are introduced to distinguish market leaders from challengers and other niche players. Challenger is coded as 1 if the focal company had a market share second only to the market leader in a three-digit SIC industry and 0 otherwise. The other

dummy variable, niche players, is coded as 1 if the focal company had a market share not ranked as number one (leader) or two (challenger) in a three-digit SIC industry and 0 otherwise.

#### IV. ANALYSIS AND RESULTS

Descriptive statistics and correlations on the analysis variables are presented in Table I. Table II presents the results of five Poisson regression models of firm orientations toward M&As.

All models show similar results. The Poisson regression coefficients of the control variable, firm size as measured by total assets, are positive and highly significant in all five models. As expected, the larger the firm, the greater the firm M&A activities. Five interaction terms are included to control for the differential effects of environmental and technological positioning factors on M&As among industry leaders, challengers, and niche players. The findings indicate that the M&A strategic behavior of all

industry players is affected by environment and technological positioning factors.

The following addresses the hypotheses testing. Hypothesis 1 predicts that industry leaders are more likely to engage in M&A activities than other firms in the same industries. Model 2 shows the test result of Hypothesis 1 in Table II. The coefficient of the challenger dummy variable is  $-0.159$  ( $p < 0.05$ ), suggesting that challengers had fewer M&A activities than did leaders. The coefficient of another dummy variable, niche players, is  $-0.203$  ( $p < 0.001$ ), suggesting that niche players also had fewer M&A activities than did leaders. The results support Hypothesis 1.

Hypothesis 2 predicts that the effects of unfavorable environmental conditions on challenger M&A strategies are greater than are those on industry leaders. The test results of Hypothesis 2 are shown in the interaction terms of the challenger dummy and the three environmental variables in Model 3. Unfavorable environmental conditions are characterized as low munificence, high volatility, and low concentration. The coefficient of the interaction effect of munificence and the challenger dummy is  $-0.428$  ( $p < 0.001$ ). The coefficient of the interaction effect of volatility and the challenger dummy is  $0.200$  ( $p < 0.001$ ). The coefficient of the interaction effect of concentration and the challenger dummy is  $-0.226$  ( $p < 0.001$ ). All of the interaction effects between environmental factors and the challenger dummy are highly significant. From the coefficients of those interaction terms, the interaction effects between environmental factors and the challenger dummy for M&As appear to be more significant than those coefficient effects for industry leaders. This result supports Hypothesis 2.

Hypothesis 3 predicts that the effects of high technology prestige on M&A strategies of niche players are greater than are those on industry leaders. The test results of Hypothesis 3 are shown in the interaction terms of the niche player dummy and the technology prestige variable in Model 4. A favorable technological positioning is characterized as high technology prestige. The coefficient of the interaction effects of technology prestige and the niche player dummy is  $0.149$  ( $p < 0.001$ ) in Model 4. The results of the interaction effects of technology prestige in Model 4 strongly support Hypothesis 3. The effects of favorable technological positioning on the M&A intensity of industry niche players are greater than are those on industry leaders. The result shows that the orientation of an industry niche player in entering M&As is positively associated with its technology prestige. An industry niche player that possesses high technology prestige might use M&A strategies to gain access to more knowledge while maintaining a certain level of ownership control over core technological assets.

Hypothesis 4 predicts that challengers are less likely to adopt M&A strategies than are industry leaders under intense technological competition. The test results of Hypothesis 4 are shown in the interaction terms of the challenger dummy and the technology crowding variable in Model 5. Unfavorable technological positioning is characterized as high technology crowding. The coefficient of the interaction effects of technology crowding and the challenger dummy is  $-0.263$  ( $p < 0.05$ ) in Model 5. The results of the interaction effects of technology crowding in Model 5 support Hypothesis 4 and show that industry

challengers tend to engage in fewer M&A actions when they are located in highly technologically competitive markets.

## V. DISCUSSION AND CONCLUSION

This empirical study provides a new outlook on firm M&A strategies. Using the same strategy for all companies is no longer feasible because different industry players must have different M&A strategies to fit within the unique external environment. The market position and technological positioning factors of firms play critical roles in developing M&A strategies. Industry environmental elements, firm market power, firm market position, and firm technological positioning all affect firm M&A behaviors and decisions. These factors all have an influence on the interactions of a host of variables. To decrease environmental uncertainty, Bergh and Lawless [8] suggested that highly diversified firms are more likely to engage in M&A actions than are less diversified firms. The reasons for this suggestion include incremental asset productivity [43], enhanced customer attraction, employee productivity, and asset growth [37]. These studies founded that corporate accounting performances improved significantly after mergers. Stuart [50] founded that organizations with high prestige and those in technologically crowded positions easily form alliances. Thus, the influences of market and technology position factors on firm strategic actions are self-evident.

This study extends the concept of market competitive strategy from the product-market level to that of the industry network. As industry rivalry becomes increasingly complex, rival firms seldom compete in single-product markets. They typically maintain large product portfolios in different life cycle stages and in multiple product categories and may compete in numerous geographic areas. Industry rivalry should be analyzed at the firm and industry levels, whereas firm networks compete or collaborate with each other simultaneously in a dynamic and uncertain world [48].

This study also broadens the positioning strategy scope to include technological positioning that the abundant literature on the RBV and the KBV of the firm can integrate with the market positioning literature. Understanding changes in industry networks requires understanding both environmental and technological cross-level forces that drive the changes. This study provides a conceptual framework and empirical evidence of how industry firms in different market positions compete with each other. In this framework, leaders, challengers, and other niche players compete with a range of M&A arrangements, such as strategic actions to leverage their technological positioning and environmental conditions. Collectively, their different roles and strategies of M&A arrangements coevolve and shape the dynamics of industry networks.

This research involved not only extending the M&A concept based on previous studies but also discovering the underlying and predictable patterns of firms in adopting M&A activities. Competitive actions are essential elements in a behavioral model of the corporate, entrepreneurial behavior of large, complex organizations [56]. This study advances the discussion at a conceptual level by describing how both technological positioning and



market position distinctly affect the relationship between M&A strategies and market players. This would provide a greater insight into understanding the internal and external factors of firms regarding the management of M&As.

In a strategic sense, a firm requires a sufficient M&A perspective to consider its market position, other competitive players, and the industrial environment. Therefore, industry leaders with the highest marketing expenditures, distribution, and price changes as well as the newest product innovations could aggressively engage in M&As to maximize their market share while maintaining premium price points. At the same time, a challenger firm competing in technologically crowded areas is unable to obtain extra market shares through M&As and should adopt competitive strategies other than M&A activities, due to market leader dominates the mainstream market and the challenger lacks the authority to upset *de facto* standards. However, challengers can acquire smaller companies to increase sales volume, and thus, avoid fighting directly with market leaders when facing unfavorable environmental conditions. Moreover, a niche player in an enhanced technological position should actively engage in M&As to gain access to external knowledge resources and improve leverage of its technological assets and learning capabilities. For example, Facebook, the market leader in social media, announced the acquisition of WhatsApp in February 2014. Through this merger, Facebook expanded the company's mobile messaging market and gained the users of WhatsApp. An additional example is the merger between Microsoft and Nokia in April 2014. The tech giant Microsoft was a niche player in the smartphone market and acquired Nokia's handset business in an effort to leverage its position in that market. Consequently, the Asha, Lumia, and X series all belong to Microsoft. This merger introduced new competition to the smartphone market. These examples demonstrate the links among M&A action, technological position, and environmental conditions.

## VI. LIMITATIONS AND EXTENSIONS

Analyses of large-scale databases such as those compiled in this study pose numerous questions that cannot be investigated without more direct observational research. Greater knowledge is required on how firms make their strategic decisions when contemplating M&A agreements. Most of the findings in this study are obtained from secondary data with relationships derived from existing theoretical frameworks. Developing numerous studies on how top management teams of market leaders, challengers, and niche players differ in their strategic logic and decision-making processes would be beneficial. In-depth case studies and observational research may allow for a more comprehensive description of how leading and challenging firms evaluate their market and technology positioning.

Another limitation of this study is that it is descriptive and does not allow for analyzing how firms achieve enhanced performance by making sound strategic decisions. Market share leaders can perform poorly and fail if they do not select strategies that fit competitive environments characterized by market uncertainty and a demand for growth [7]. Future research should examine this issue by developing firm performance indicators

such as sales growth, Tobin's Q, and returns on assets as dependent variables.

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