# An Empirical Test of Target Knowledge Base on the Market Competitiveness of Technology Merger and Acquisition
## Based on the Mediated Moderation Model

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**Abstract**

Taking 518 technology mergers and acquisitions of new generation information technology listed companies in Shanghai and Shenzhen A shares from 2013 to 2017 as research samples, this paper further studies the regulating effect of absorptive capacity and the mediating effect of marketing ability on the basis of empirical testing of target knowledge base and the market competitiveness of the acquirer by constructing a regulating model with intermediary. It is found that: (1) Target knowledge base has a positive impact on the market competitiveness and marketing ability of the acquirer; (2) marketing ability plays an intermediary effect between target knowledge base and the market competitiveness of the acquirer; (3) absorptive capacity has a positive regulating effect on target knowledge base and the marketing ability of the acquirer. The regulating effect of absorptive capacity on target knowledge base and the market competitiveness of the acquirer is partially realized through the intermediary of marketing ability.

***Keywords***-*knowledge base; marketing ability; absorptive capacity; market competitiveness; technology merger and acquisition*

## 1. INTRODUCTION

In March 2021, the "14th Five-Year Plan" promulgated by the State Council and the Outline of the Long-Term Goals for 2035 clearly put forward to focus on the new generation of strategic emerging industries such as information technology, enhance the ability of factor support, promote the integration and innovation of information technology and biotechnology, and encourage mergers and acquisitions of enterprises and technological innovation. Especially affected by the pneumonia epidemic in COVID-19, The global economy has been hit hard, and the traditional manufacturing industry has suffered serious losses. At the same time, the wide application of information technologies such as online education, intelligent medical care, big data and artificial intelligence has played a more important role in epidemic prevention work, highlighting the important position of the new generation of information technology in national economic development and national economy and people's livelihood. The new generation of information technology enterprises have developed rapidly since the "Twelfth Five-Year Plan" was formally determined, However, problems such as slow technology iteration and core technology being subject to others have always limited the improvement of enterprises' innovation ability. At the same time, considering the high risk of innovation behavior, it is still uncertain whether knowledge and technology advantages can be transformed into market competitiveness, which has become an important problem in current development. As a new way of knowledge acquisition, does technology M&A contribute to the formation of market competitiveness? Further research is needed.

This paper reviews the literature from the perspectives of knowledge acquisition and market

competitiveness. From the current results of knowledge acquisition, Xie (2018) [1] found that knowledge acquisition has a positive impact on the breakthrough and innovation performance of high-tech enterprises. Chang (2017) [2] found that the incentive effect of supplier task participation further has a positive impact on product innovation performance through the intermediary role of knowledge acquisition. Berchicci (2013) [3] believes that external knowledge acquisition has a positive relationship with innovation performance. Fan (2014) [4] found that network capability plays a positive role in breaking through innovation performance, in which tacit knowledge acquisition plays an intermediary role. Zhang (2014) [5] found that knowledge accumulation can improve enterprise growth performance through innovation capability. Pan (2017) [6] believes that enterprises can rely on internal knowledge to integrate new knowledge from external sources, expand the operation ideas of enterprise marketing activities, and then improve marketing ability. Fan (2016) [7] found that internal knowledge sharing and external market acquisition help to improve enterprise innovation performance, and the process is realized through marketing exploration and marketing development. Li (2017) [8] found that external network knowledge can improve the performance of enterprise service innovation. Through 156 survey samples, Chen (2019) [9] found that external knowledge acquisition contributes to the improvement of marketing performance through the intermediary role of marketing ability. From the perspective of influencing factors of market competitiveness, Santos-Vijande (2012) [10] believes that an organization's learning ability is the key strategic ability to compete in the modern market, and organizational learning ability will affect the market competitiveness of enterprises. Subramanian (2012) [11] believes that disclosure of information about corporate governance practices by companies in international competition will improve market competitiveness. Wang (2014) [12] believes that the increase in cash holdings will enhance the competitive advantage of enterprises. Zhao (2015) [13] believes that administrative-based command and control regulations and market-based environmental regulations have promoted the transformation of enterprise behavior to green development and improved enterprise competitiveness. Ungerman (2018) [14] believes that the greatest impact of enterprise marketing innovation is to improve the market competitiveness of enterprises. Peng (2019) [15] believes that government subsidies are conducive to the follow-up of other investors, thus enhancing the market competitiveness of enterprises. Han (2020) [16] believes that effective risk management for overseas business environment determines the competitiveness of enterprises in overseas markets. Liu (2021) [17] believes that under the influence of external factors, enterprises will establish a good corporate image and enhance market competitiveness by fulfilling corporate social responsibility. To sum up,

scholars have conducted in-depth research based on the results of knowledge acquisition and the influencing factors of market competitiveness, but they have not linked the two in-depth discussions. At the same time, they have not conducted in-depth research on the relationship between knowledge acquired through mergers and acquisitions and the market competitiveness of enterprises in the context of mergers and acquisitions, and there are some research deficiencies. Therefore, in the context of technology mergers and acquisitions, this paper puts forward the action path of "Target Knowledge Base-Marketing Ability-Market Competitiveness", studies the mediating effect of marketing ability and the regulating effect of absorptive capability, and takes the technology mergers and acquisitions of the new generation of information technology enterprises from 2013 to 2017 as research samples for empirical test. The purpose of this study is to deeply reveal the mechanism of the new generation of information technology enterprises' knowledge acquisition on the innovation performance of technology mergers and acquisitions, and to provide suggestions for improving the market competitiveness of enterprises.

## 2. THEORETICAL ANALYSIS AND RESEARCH HYPOTHESIS

### 2.1. The Influence of Target Knowledge Base on The Market Competitiveness of Merger and Acquisition

For the new generation of information technology enterprises, knowledge resources should become an important symbol of the core competitiveness of enterprises. Therefore, the more knowledge resources an enterprise has, the stronger its technological innovation ability, the greater its development potential, and the more it can use new products and technologies to occupy the market, thus enhancing its market competitiveness. However, at present, the knowledge accumulation of the new generation of information technology enterprises is limited. In the process of acquiring technical knowledge resources through technology mergers and acquisitions, target knowledge base will gradually be transferred to the acquirer, which will increase the knowledge reserve of the acquirer, thus enhancing its technical strength, developing more new products and enhancing its market competitiveness. Zhang (2016) [18] believes that the more knowledge reserves the target party has, the more knowledge the acquirer can acquire through mergers and acquisitions, thus exerting the scale effect of knowledge. Hao (2015) [19] believes that the scale of target knowledge base is positively related to the innovation performance after the merger. The larger the scale of the knowledge base, the more conducive it is to the improvement of the company's performance after the merger and integration, thus obtaining a sustained competitive advantage. Chen

(2019) [9] also believes that enterprises can maintain their competitive advantages by absorbing externally acquired heterogeneous knowledge. Therefore, this paper makes the assumption:

H1: Target knowledge base has a positive impact on the market competitiveness of the acquirer.

## 2.2. The Influence of Target Knowledge Base on Marketing Ability

Marketing ability is an ability for enterprises to use knowledge and resources to meet customer needs and gain competitive advantages [20]. Chen (2019) [9] believes that the acquisition of external knowledge has a significant impact on every link of marketing, making the marketing ability of enterprises rapidly improve. When the new generation of information technology enterprises acquire the knowledge resources of the target party through technology mergers and acquisitions, The expansion of external knowledge greatly increases the knowledge reserve of the acquirer and enhances its sensitivity to the market. It can better deal with information such as customer preferences, competitor trends and market dynamics. Through the absorption of the knowledge of the target party, it can be used in marketing activities to realize the success of marketing strategies and ultimately improve the marketing ability. Pan (2017) [6] also believes that new information and new ideas from external sources have enhanced the diversity of enterprises. The combination of these diversified knowledge and internal knowledge of enterprises can generate new knowledge combinations, which is conducive to broadening the solutions of related marketing activities and improving the marketing ability of enterprises. Chen (2019) [9] found through empirical research that external knowledge acquisition has a positive impact on the marketing ability of enterprises. Fan (2016) [7] also found through empirical research that market knowledge acquisition mode has a positive impact on the marketing exploration and marketing development capabilities of enterprises.

H2: Target knowledge base has a positive impact on the marketing ability of the acquirer.

## 2.3. Mediating Effect of Marketing Ability

The supplement of target knowledge only increases the reserve for enterprises. From the increase of knowledge reserve to the enhancement of market competitiveness, marketing ability needs to play a role in it. Only when knowledge is transformed into ability and applied through market practice can competitive advantage be formed, Therefore, the acquirer needs the bridge of marketing ability to improve the market competitiveness from the knowledge acquisition of the target party, which shows that marketing ability plays an intermediary role between the knowledge acquisition of

the target party and the increase of the market competitiveness of the acquirer. Yang (2016) [21] believes that enterprises can improve their market competitiveness by making full use of the existing knowledge base and making integrated improvements in marketing ability. Through empirical research, Wang (2015) [22] concluded that the enhancement of marketing ability plays a positive role in competitive advantage. Chen (2019) [9] also concluded that external knowledge acquisition has a positive impact on marketing performance through the intermediary role of marketing ability. Therefore, this paper puts forward the hypothesis:

H3: Marketing ability plays an intermediary role between target knowledge base and the market competitiveness of the acquirer.

## 2.4. Regulation of Absorption Capacity

Zahra believe that absorptive capacity is the ability of enterprises to identify, digest and apply external knowledge [23]. Wang (2019) [24] believes that absorptive capacity refers to the transformation and utilization of new knowledge in merger and acquisition integration. In this process, the support of research and development funds is needed. Increasing research and development investment is conducive to improving the integration and transformation efficiency of external knowledge. Based on the above theoretical analysis, after the knowledge of the target party is transferred to the acquirer, it can indeed increase the knowledge reserve of the acquirer, thus using the knowledge to form marketing ability. However, it is difficult to transfer tacit knowledge in knowledge, and the transfer efficiency is low, which requires strong absorptive capacity of enterprises. The stronger the absorptive capacity of the acquirer, the more it can make full use of the knowledge after acquiring the knowledge of the target party, and the greater the improvement of marketing ability. It reflects the regulating effect of absorptive capacity. Meng (2013) [25] also believes that the absorptive capacity of the acquirer largely affects the transmission of tacit knowledge. The stronger the absorptive capacity, the richer the proprietary knowledge obtained by the acquirer, the more conducive it is to improve the marketing capacity and enhance the market competitiveness of the acquirer. This paper holds that the regulatory effect of absorptive capacity on knowledge base and market competitiveness is realized through the intermediary of marketing capacity. Therefore, it is assumed that:

H4a: Absorptive capacity has a positive regulatory effect on the relationship between target knowledge base and the marketing ability of the acquirer.

H4b: The regulatory effect of absorptive capacity on target knowledge base and the market competitiveness of the acquirer is realized through the intermediary of marketing capacity.

The theoretical model constructed in this paper is shown in Figure 1 below:
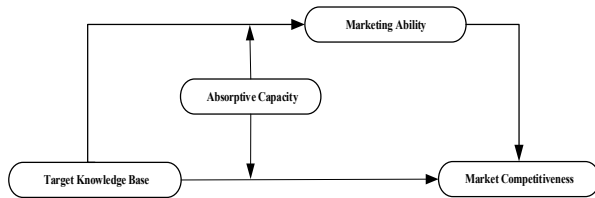


**Fig. 1** Theoretical model

## 3. RESEARCH DESIGN

### 3.1. Samples and Data Sources

This study refers to the screening method of Wang [26]: The first step is to define the companies that meet the business scope in the A-share concept section of Wind database as the new generation information technology listed companies by taking the 5 key directions and 20 detailed sub-directions of the new generation information technology in the Guidance List of Key Products and Services in Strategic Emerging Industries (2016 Edition) as the business scope. The observation period of all data is from 2008 to 2019; the second step is to collect the merger and acquisition events of such companies from 2013 to 2017, and eliminate samples such as transaction failure, too small amount and missing data; the third step is to refer to the two criteria for defining technology mergers and acquisitions proposed by Ahuja [27], that is, whether the target party has obtained patent authorization in the five years before the merger and acquisition, or whether the merger and acquisition announcement clearly aims at acquiring technology, and finally determine 518 technology mergers and acquisitions of 300 companies. The data comes from wind database and Taian database, and the patent data comes from the State Intellectual Property Office.

### 3.2. Variable Measurement

#### 3.2.1. Explained variable:

Market competitiveness (MC). Drawing lessons from Wang's (2020) [28] point of view, market competitiveness is measured by market share, that is, the ratio of operating income of enterprises to total income of industries in the sample. However, considering that the sample of technology mergers and acquisitions in this article does not involve all the new generation of information technology enterprises, the overall income of the new generation of information technology industry is calculated according to the detailed business scope of the wind database concept section corresponding to the industry classification of the CSRC.

#### 3.2.2. Explanatory variable:

Target knowledge base (KB). Refer to the measurement methods of Zhang (2016) [18] and Ma (2017) [29], and select the total value of the number of invention patents granted by the target party in the five years before the merger and acquisition.

#### 3.2.3. Regulated variable:

Absorptive capacity (AC). Absorptive capacity refers to the practice of Wang (2019) [24], choosing R&D investment as the measurement standard and taking the natural logarithm of R&D investment in the year amount as the measurement standard.

#### 3.2.4. Mediation variable:

Marketing ability (MA). Drawing lessons from the measurement methods of Cui (2018) [20], the comprehensive value is obtained by factor analysis of three indicators: sales expenses, proportion of sales personnel and inventory turnover rate.

#### 3.2.5. Control variables:

Based on the research of M&A scenarios by many scholars, this paper selects the enterprise scale (ES), growth rate (GR), asset liability (AL) [18,24]and financing constraint (FC) [26]. At the same time, the scale gap (SG) is selected as the control variable from the perspective of the differences between the parties to the merger. The enterprise scale is measured by the natural logarithm of the total assets of the acquirer in the year before the acquisition. Growth rate is measured by the operating revenue growth rate of the acquirer in the year before the acquisition. The asset liability ratio is measured by the ratio of the total liabilities of the acquirer to the total assets of the previous year. With reference to Wang Wei's practice, six financial indicators are selected to construct the financing constraint index [26]. The scale gap is measured by the ratio of Merger and Acquisition transaction volume to the total assets of the acquirer in the year before Merger and Acquisition.

## 4. EMPIRICAL ANALYSIS

### 4.1. Descriptive Statistics and Correlation Analysis

Descriptive statistics and correlation analysis of each variable are shown in Table 1. It can be seen that the variable coefficients are less than 0.4. At the same time, after testing, the VIF value of each variable is no more than 10. It can be judged that there is no multicollinearity problem among variables.

**TABLE 1.** DESCRIPTIVE STATISTICS AND CORRELATION ANALYSIS OF MAIN VARIABLES (N=518)

| | Average | Standard | MC | KB | MA | AC |
|---|---|---|---|---|---|---|
| MC | 0.003 | 0.011 | 1 | | | |
| KB | 3.625 | 10.432 | 0.12*** | 1 | | |
| MA | 0.000 | 0.493 | 0.29*** | 0.09** | 1 | |
| AC | 18.128 | 1.171 | 0.40*** | 0.18** | 0.13*** | 1 |

***, **, * represent significant (double-tailed) at 1%, 5%, and 10% levels, respectively, the same below.

## 4.2. Regression Analysis

Referring to Ye's (2013) [30] intermediary adjustment model test steps, the sequential regression test method is selected to build the model. After data standardization, Ward test was carried out on each model, and it was found that the significance was 0.00, indicating that there was a problem of heteroscedasticity between groups. After robust Hausmann test, it is found to be suitable for random effect model. Therefore, the feasible generalized least square model (FGLS) is finally selected. Compared with GLS, FGLS is more suitable for solving the problem of heteroscedasticity between groups, and is more suitable for the unbalanced panel data in this paper.

The regression results of each model are shown in Table 2. The results of model (1) show that the explanatory variables have a positive impact on the explained variables ($\beta$= 1.789, P < 0.01). Assuming H1 is verified and the coefficient of cross-multiplication term is significant, it indicates that the regulated variables have a regulating effect on the main effect. Model (2) shows that explanatory variables have a significant mediating effect ($\beta$= 0.850, P < 0.01), and H2 is verified. Model (3) shows that the mediation has a significant effect on the explained variables ($\beta$= 0.368, P < 0.01), indicating that H3 has been verified. At the same time, the cross-multiplication coefficient in this paper is significant in model (3) ($\beta$= 0.807, p < 0.01), indicating that the regulating effect of absorptive capacity is partly realized through the mediating effect of potential and actual absorptive capacity, and the other part is realized through the main effect. Therefore, it is assumed that H4b holds.

**TABLE 2.** REGRESSION RESULTS TABLE (N=518)

| Variable | (1) MC | (2) MA | (3) MC |
|---|---|---|---|
| KB | 1.789** (13.46) | 0.850*** (6.09) | 0.784*** (4.62) |
| AC | 0.087*** (10.30) | 0.051** (12.78) | 0.103*** (13.17) |
| KB×AC | 1.853*** (13.38) | 0.871*** (5.90) | 0.807*** (4.44) |
| MA | - | - | 0.368*** (19.29) |
| ES | 0.318*** (48.30) | -0.017** (-2.41) | 0.274*** (27.37) |
| GR | -0.094*** (-11.36) | -0.008* (-1.85) | -0.084*** (-9.46) |
| AL | 0.027*** (3.97) | 0.007 (1.36) | 0.031*** (8.61) |
| SG | 0.070*** (10.41) | 0.017*** (4.94) | 0.045*** (3.96) |
| FC | 0.001 (0.28) | 0.017*** (2.94) | 0.008** (2.16) |
| Constant term | 0.001 (0.24) | -0.007* (-1.85) | -0.035*** (-6.67) |
| Wald Chi2 | 17120*** | 481*** | 2674*** |

## 4.3. Robustness test

In this study, two methods are used for robustness test: (1) Reducing samples and replacing variables for robustness test. The original observation period from 2013 to 2017 will be reduced to 2014 to 2016, the measurement method of comprehensive index of marketing ability will be changed to single index sales expense measurement, and the one-year lag data of market competitiveness will be changed to the current year data. On the basis of the original model, it is found that there is no substantial difference with the previous empirical results; (2) heckman two-stage method. In order to avoid sample selection bias, in the first stage of probit regression, the knowledge base of the target side

was divided into 1 and 0 groups according to the median standard, and was used as the explained variable. The explanatory variable additionally adds the target transaction size as an exogenous tool variable to calculate the IRM value of each sample. IRM is added to the model of the second stage as an additional variable. It was found that there was no substantial change in the positive, negative and significant of the main variables.

## 5. CONCLUSIONS AND SUGGESTIONS

### 5.1. Conclusion

This paper takes 518 technology mergers and acquisitions of new generation information technology listed companies in Shanghai and Shenzhen A shares from 2013 to 2017 as research samples, and constructs a regulating model with intermediaries. Based on the empirical test of target knowledge base and the market competitiveness of the acquirer, this paper further studies the regulating role of absorptive capacity and the mediating role of marketing ability. It is found that: (1) Target knowledge base has a positive impact on the marketing ability and market competitiveness of the acquirer; (2) marketing ability plays an intermediary effect between target knowledge base and the market competitiveness of the acquirer; (3) absorptive capacity has a positive regulating effect on target knowledge base and the marketing ability of the acquirer. The regulating effect of absorptive capacity on target knowledge base and the market competitiveness of the acquirer is partially realized through the intermediary of marketing ability.

The innovations of this paper are as follows: (1) In the context of technology mergers and acquisitions, a theoretical model of "Target Knowledge Base-Marketing Ability-Market Competitiveness" is constructed from the perspective of the acquirer, which complements the research on the influencing factors of market competitiveness. Further reveal the mechanism of knowledge resource acquisition on market competitiveness in technology mergers and acquisitions; (2) explore the mediating effect of marketing ability between the target side's knowledge base and market competitiveness, and reveal the specific path and effect of the target side's knowledge base to market competitiveness; (3) taking absorptive capacity as a contingency factor, this paper discusses its regulating effect on the relationship between target knowledge base and marketing ability, which is helpful for the new generation of information technology enterprises to better absorb and utilize the knowledge resources acquired by technology mergers and acquisitions, and broaden marketing ideas and coping strategies.

### 5.2. Recommendations

According to the research conclusions of this paper,

the suggestions from the perspective of M & A are as follows: first, reasonably select the target enterprise. On the one hand, they need to examine the knowledge reserves of the target parties and select merger and acquisition targets with rich knowledge reserves. On the other hand, the tacit knowledge of the target party is measured and estimated concretely, and the potential value evaluation of proprietary ability promotion based on the assumption of integration and utilization of knowledge resources is done well. In order to enable enterprises to obtain more knowledge resources, accelerate the leap of enterprise innovation track and the cultivation of professional ability. The second is to pay attention to improving marketing ability. The promotion of market competitiveness needs the role of marketing ability, and the promotion of marketing ability needs the support of knowledge base. Enterprises should pay attention to the understanding, integration and application of target party knowledge, effectively transform the acquired knowledge into proprietary marketing ability, give full play to its advantages in marketing activities, and then ensure the improvement of enterprise market competitiveness. Third, attach importance to the absorptive capacity of enterprises. As that recipient of knowledge, Enterprises should pay attention to expanding the depth of knowledge transfer by improving absorptive capacity, actively guide the tacit knowledge transfer willingness of target enterprises, establish an effective knowledge learning and transfer mechanism, pay attention to the indirect role of absorptive capacity in knowledge acquisition of technology mergers and acquisitions, and implement active R&D decisions to realize the continuous accumulation of absorptive capacity.

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