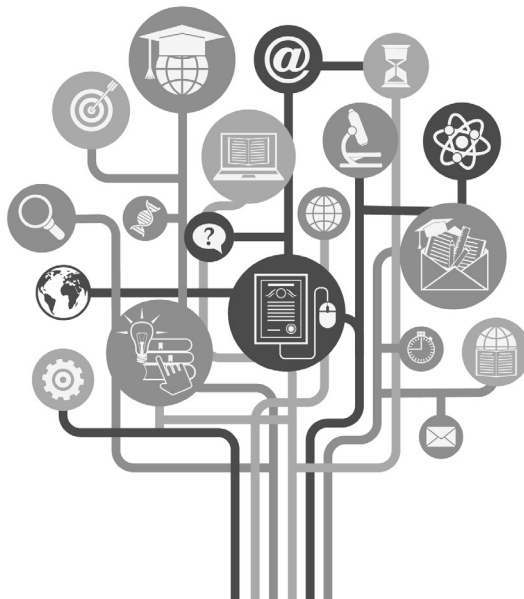# 9

Research on Synergistic Effect Evaluation of Merger and Acquisition of Cement Industry of China

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Abstract

Under the background of serious overcapacity and supply-side structural reform in China's cement industry, mergers and acquisitions of cement enterprises are increasingly frequent, but little is known whether the synergistic effect after merger and reorganization is significant. This study is based on the merger and reorganization and synergistic effect theory, from the operating synergy, management and financial synergy effect of China cement enterprise merger synergy effect evaluation system, including three primary indicators, 12 secondary indicators, and 36 tertiary indicators, in mainland China. 15 cement listed companies were selected for empirical research, using weighted factor analysis of merger and reorganization synergy evaluation. The research results showed that significant business synergies; management synergies were significant in production management and organizational management; the overall performance of financial synergies was not significant. The conclusion of this study helped to enrich the synergistic effect theory of merger and reorganization, and also provided valuable enlightenment for the subsequent merger and reorganization practice of other cement enterprises.

Keywords : Cement Enterprises; Merger and Reorganization; Synergies

Introduction

According to the latest data from the National Bureau of Statistics, China's cement production was 2.377 billion tons, accounting for more than 50% of the world's total cement production, ranking first in the world for more than 20 consecutive years. However, with the slowdown of investment in real estate and infrastructure construction, the market demand for cement is greatly reduced, resulting in the utilization rate of cement production capacity that has fallen below the 70% warning line for many consecutive years. The structural contradiction of the cement industry is becoming increasingly prominent. At present, China's cement industry is in a long-term and overall era of overcapacity.

On July 26, 2016, The State Council General Office issued "on promoting the central enterprise restructuring and restructuring guidance", made clear about the cement industry supply side reform to deepen the direction of the industry mergers and acquisitions and reorganization, encourage central enterprises to actively yet prudently mergers and acquisitions, in order to obtain key technology, core resources, well-known brands and market channels, so as to improve industrial concentration, promote quality brand promotion. At the same time, enterprises at all levels have established and improved the evaluation mechanism of merger and reorganization, strengthened the linkage and integration of enterprises after merger and reorganization, promoted the coordination and integration of management, business, technology, market, culture and human resources, and ensured the realization of the expected goals of merger and reorganization.

Under the background of the central enterprise reform and the supply-side structural reform, a series of mergers and acquisitions have occurred in the cement industry in recent years. What are the synergistic

effects of these mergers and acquisitions activities? What is the realization path of various synergies in the process of merger and reorganization decision-making? How is the overall performance of the synergies of mergers and acquisitions? Based on the above thinking, this study systematically studies the synergistic effect of the merger and reorganization activities of cement enterprises.

Literature Review

M&A Theory

From different theoretical literatures, M&A restructuring is an act of transferring rights in the course of the movement of the change of control of the enterprise, which is carried out by the various rights holders according to the institutional arrangements made by the property rights of the enterprise. Encyclopedia Americana explains M&A restructuring as follows: " Merger refers to the combination of two or more enterprise organizations into one enterprise organization. As one manufacturer continues to exist, other manufacturers lose their independent status, and only the remaining manufacturers retain their original names and articles of association, and obtain other manufacturers' assets." The Company Law of the People's Republic of China stipulates that mergers and acquisitions belong to a kind of company merger, which is divided into two forms: absorption merger and new merger. The merger and acquisition of cement companies in this study is mainly based on the two means of share absorption and holding, which are forms of absorption and merger under the company law.

Corporate mergers and acquisitions are usually the result of the combination and balance of multiple motives. Roll (1986) aims to satisfy management ambitions and motivation to demonstrate their management skills and skills. Meeks (1997) attributes them to the acquisition of market

power, increased market share and market control; Barney (2001) considers the vertical mergers and acquisitions of companies with excess resources and management capabilities to deliver these capabilities across industries.

Synergy Theory

The American strategic management scientist, H. igor Ansoff in the 1960s introduced the concept of enterprise management, his research on synergies mainly focuses on economics, that the synergy comes from the enterprise through the common application of technology, common storage sales, improve the utilization of equipment and facilities, reduce staff learning cost, sharing distribution channels to obtain economies of scale, reduce the operating cost of enterprises after mergers and acquisitions. Mark L. Sirower in the trap of synergies: how to avoid failure in the book refers to the two companies after merger operating benefit than they independent operation when the expected benefit of the increase, refers to the increased competitiveness, lead to cash flow more than two companies each expected level.

The synergies produced by mergers and acquisitions include operating synergies, management synergies and financial synergies. Marshall (1890) believes that economies of scale are not limited to economies of production scale, but also from cost savings caused by research and development, procurement and sales and operation management; Alexander R. Slusky (1999) pointed out that financing from external enterprises bears important transaction costs, and mergers and acquisitions themselves can avoid such external transactions, thus reducing financing costs to create value. And Chinese scholars mainly from the functional layer and resource layer research synergy, functional layer research is according to the traditional analysis method, from the management, research and development, operation, sales and other basic functions of

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synergy, Chang-zheng wang (2002) on the basis of enterprise value chain evaluation will synergistic effect into pure increase effect, strengthening effect, transfer and diffusion effect and complementary effect of four types, and how to achieve synergy through the value chain restructuring is discussed. Resource layer research is standing in the enterprise resources perspective study the source of collaborative value creation, analyze the merger and financial capital and knowledge capital may cause synergy, wen-gang liu (1999) analyzes the influence of intangible assets on mergers and acquisitions, think in the enterprise mergers and acquisitions relying on brand, patent technology, enterprise culture and other intangible assets advantage transfer and play can produce synergistic effect, and greatly improve acquisition performance.

Research Objectives

1. Build a synergistic effect evaluation index system of merger and reorganization of Chinese cement enterprises;

2. Explore the realization path of synergies in the decision-making process of merger and reorganization, and analyze the synergistic effect performance of different merger and reorganization modes;

3. Use the factor analysis method to empirically analyze and test the synergistic effect of merger and reorganization of Chinese cement enterprises.

Research Design

Sample selection

There are no more than 30 large-scale cement enterprises in China, of which less than 20 are listed on the mainland China and Hong Kong stock markets. In view of the requirements of the accounting standards

and financial regulations of mainland listed companies, excluding the cement business is not their main business Listed companies with business income. This study selected from 2008-2019 10 years of merger and reorganization business in China of 15 listed cement enterprises for research, including conch cement, Huaxin cement, Jinyu group, Fujian cement and Jidong cement, etc., basically covers all the large cement enterprises, can reflect the basic situation of the merger and reorganization synergy.

Data sources

The research data mainly came from the "Overview of the Listed Company Reorganization Matters" and the "Listed Company Reorganization Database" published by the China Securities Journal from 2008 to 2019, the annual report released by the research samples, the official enterprise website, China Cement Network and China Building Materials Magazine.

Statistical analysis methods

This paper uses SPSS 22 to evaluate the synergy of Chinese cement industry by factor analysis. Research idea: Perform factor analysis on the set indicators and extract factor variables, calculate the variance contribution rate and score of each factor, and then construct a comprehensive scoring model based on the sum of the variance contribution rate of each factor and the product of the factor's score.

Research Results and Inspiration

The evaluation index system for the synergistic effect of merger and reorganization of enterprises in China's cement industry was constructed, Covering three first-level indicators, including operation synergy, management synergy and financial synergy, Each primary index set four secondary indicators, Including organization and management coordination, production management coordination, capital cost effect, capital demand,

financial management ability, profitability, operating capacity and solvency and other 12 secondary indicators, Each 2-level index has set up three more three-level indicators, It includes 36 three-level indicators, such as profit margin on total assets, return on equity, net interest rate on sales, current ratio and asset-liability ratio. See Table 1 below for more details :

Table 1 Evaluation index system of synergy effect of M&A and restructuring of Chinese cement enterprises

Objectives	Tier 1 indicators	Secondary indicators	Three-level indicators
Synergy effect Of Mergers and acquisitions	Operating synergy	profitability	Total assets profit margin Return on net assets Sales net interest rate
		Growth ability	net profit growth rate Total assets growth rate Main business revenue growth rate
		operation capacity	inventory turnover ratio average accounts receivable turnover ratio turnover of total capital
		debt paying ability	current ratio asset-liability ratio cash ratio

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Table 1   Evaluation index system of synergy effect of M&A and restructuring of Chinese cement enterprises (continue)

Objectives	Tier 1 indicators	Secondary indicators	Three-level indicators
	Management synergy	management of organization	Reasonable of right distribution
			Organizational structure rationality
			Smooth communication between both organisations
		human resources	Coordination and allocation of human resources
			The ability of human resources management has been improved
			Reduce the human resource costs of enterprises
		Brand strategy	Main products and business tend to be unified
			Brand culture is highly integrated
			Strategic development is more macro and long-term
		production control	Eliminate technical barriers and improve the level of production technology
			spare parts sharing, equipment utilization efficiency improved
			Absorbe advanced management modes and methods to improve production and management efficiency

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Table 1 Evaluation index system of synergy effect of M&A and restructuring of Chinese cement enterprises (continue)

Objectives	Tier 1 indicators	Secondary indicators	Three-level indicators
Synergy effect Of Mergers and acquisitions	Financial synergy	financial expenses	Reduce the cost of corporate securities issuance Promote enterprise equity financing Risk premium decreased
		Reasonable tax saving	Reasonable use of the deferred clause of the loss of the tax law Capital gains replace conventional gains Following on to the preferential tax policies
		Capital demand	Centralized management of cash, inventory, and accounts receivables Stripping of non-performing assets and redundant fixed assets Internal capital circulation, improve the capital utilization efficiency
		Financial management ability	We will promote the internal financial structure adjustment of enterprises Benefit to control operating costs Benefit integration integrate financial resources of both sides

The realization path and performance of the synergistic effect of different M&A and restructuring models:

(1) The synergistic effect of horizontal mergers and acquisitions comes from the scale economy effect of the increasing market share and the decrease of the average cost of the unit product. This coincides with Adam Smith's macroeconomic theory, The Adam Smith believes that

economies of scale come from the division of labor and specialization brought about by mass production, It promotes the increase in labor productivity. Through the research on the synergistic effect of horizontal merger and reorganization of cement enterprises, it is found that the operation synergistic effect is not limited to the economy of production scale, It may also come from the cost savings caused by specialization in research and development, procurement and sales, and operation management. The synergistic effect of vertical merger and reorganization comes from the saving of transaction costs after merger and reorganization. Vertical merger and reorganization transform the original market-oriented transaction behavior into internal transaction behavior, thus saving transaction costs and reducing asset risks. This research result and Ronald H. The Coase's theory of transaction costs fits in well.

(2) After the horizontal merger and reorganization, the organizational capital, organizational experience and management personnel of the enterprise can be transferred as a whole, so as to improve the overall management level of the enterprise after the merger and reorganization, and generate management synergy. The study found the realization path of the horizontal merger and reorganization management synergy effect of cement enterprises Similar to Shun-long Zhao (2004), who used the theory of enterprise organizational structure to study the formation of enterprise organizational capital, and analyzed the formation path of organizational capital from three levels of institutional structure, hierarchical structure, and cultural structure. Vertical mergers and acquisitions In the decision-making process of mergers and acquisitions, due to different industry attributes, the ability of the exclusive non-manager of the enterprise cannot be transferred.

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(3) The financial synergy effect is mainly to obtain synergistic benefits through reasonable tax avoidance and reduction of capital costs in M&A and restructuring decisions. Since both parties are generally in the same industry, various taxes are basically the same, and there is little room for reasonable tax avoidance; while mixed mergers and acquisitions The function of capital supply in the capital market is transformed into the allocation of funds within the enterprise, which reduces the cost of external financing and creates financial synergy value.

Factor analysis method empirically analyzes and examines the synergistic effect of mergers and acquisitions of Chinese cement enterprises.

(1) Factor analysis feasibility test

In this study, KMO test and Bartlett's spherical test were used to test the collected sample data for factor analysis. The SPSS software test results are as follows :

Table 2   Results of the reliability and validity tests for the factor analysis

	T-1 Phase	T Phase	T+1 Phase	T+2 Phase
The Kaiser-Meyer-Olki metric	.853	.872	.842	.886
Bartlett's sphericity test, Sig.	.000	.000	.000	.000

From the table above, we can see that the KMO values of the data for each period are all higher than 0.8, well above the threshold value of 0.5, indicating that it shows that there is a correlation between the variables, which is in line with the requirements of the study; then we can look at the results of the Bartlett's spherical test in the table, and the Sig. values are all 0.000 (i.e. p-value < 0.05), indicating that there is a correlation between the variables and the sample data is suitable for factor analysis.

(2) Determining the common factor

In this study, the public factor was extracted using the principal factor method, due to the lack of load in the initial factor load matrix, the factor score was calculated by regression to better interpret the principal factor and rotate by maximum variance. Due to space limitations, only the calculation process of operating synergies is shown here, and the calculation process of other evaluation indicators is reasonable.

Table 3 Total variance explained in period T-1

element	Initial eigenvalue			Extract the sum of the square to load			Rotate the sum of the square to load		
	amount to	variance%	accumulate%	amount to	variance%	accumulate%	amount to	variance%	accumulate%
1	4.774	39.782	39.782	4.774	39.782	39.782	4.024	33.531	33.531
2	2.608	21.730	61.512	2.608	21.730	61.512	2.646	22.047	55.577
3	1.971	16.428	77.940	1.971	16.428	77.940	2.567	21.395	76.972
4	1.229	10.244	88.184	1.229	10.244	88.184	1.345	11.212	88.184
5	.656	5.463	93.648						
6	.504	4.197	97.844						
7	.153	1.275	99.119						
8	.094	.783	99.902						
9	.008	.067	99.970						
10	.004	.030	100.000						
11	.002	.000	100.000						
12	.000	.000	100.000						

Extraction method: main component analysis.

According to the extraction principle of the characteristic value greater than 1, there are four factors eligible, each period of public factors extraction results show that the first four factors of the cumulative contribution rate are 80%, namely the first four public factors explained the variance accounted for 80% of the total variance, with the four public factors to reflect the four years of lost information, so with the four public factors can comprehensively reflect the Chinese cement enterprises before and after four years of business synergies.

(3) Build the scoring model

In order to further compare the operating effect of the company before and after the merger and reorganization of cement enterprises, the variance contribution rate and score of each factor are calculated, and the score function of the product between the variance contribution rate of each factor and the score product of each factor is constructed.

Table 4 The factor score co-efficient matrix for phase T-1

	element			
	1	2	3	4
Total Assets margin (x1)	.003	.365	.027	-.133
Return on equity (x2)	.020	.330	.116	.303
Net Sales Interest Rate (x3)	-.094	.393	.011	-.117
Net profit growth rate (x4)	.235	-.035	-.042	-.042
Total assets growth rate (x5)	.234	-.031	-.038	-.038
Growth Rate of Main Business Revenue (x6)	.233	-.032	-.042	-.044
Inventory turnover rate (x7)	.187	-.062	.188	-.229
Accounts receivable turnover rate (x8)	.037	-.057	-.301	-.123
Total assets turnover rate (x9)	.239	.004	.130	.181
Flow ratio (x10)	.040	.101	.401	-.016
Asset-liability ratio (x11)	.009	-.050	.058	.738
Cash ratio (x12)	.030	-.019	.346	.067

Extraction method,: the main component.

Rotation method: the orthogonal rotation method with Kaiser standardization.

Table 4 shows the expression of each factor score function in the T-1 phase :

$f1=$ 0.003x1+0.02x2-.094x3+0.235x4+0.234x5+0.233x6+0.187x7+0.037x8+0.239x9+0.04 x10+0.009x11+0.03x12

$f2=$ 0.365x1+0.33x2+0.393x3-0.035x4-0.031x5-0.032x6-0.062x7-0.057x8+0.004x9+ 0.101 x10-0.05x11-0.19x12

$f3=$ 0.027x1+0.116x2+0.011x3-0.042x4-0.038x5-0.042x6+0.188x7-0.301x8+0.13x9+ 0.401x10+0.058x11+0.346x12

$f4=$ -0.133x1+0.303x2-0.117x3-0.042x4-0.038x5-0.044x6-0.229x7-0.123x8+0.181x9-0.016x10+0.738x11+0.067x12

Therefore, the phase T-1 comprehensive score model is :

F (T-1) = (33.531f1+22.047f2+21.395f3+11.212f4) /88.184

Similarly, the combined T, T+1 and T+2 scores are modelled as:

F (T) = (30.089f1+27.409f2+13.132f3+9.849f4) /80.479

F (T+1) = (32.787f1+19.572f2+17.726f3+14.655f4) /84.74

F (T+2) = (32.467f1+20.524f2+16.071f3+11.962f4) /81.024

(4) Test results

According to the first four comprehensive score model, can calculate the comprehensive score of the merger and reorganization of samples, according to the comprehensive score difference before and after merger and reorganization, using paired sample t test the difference between the difference before and after merger and reorganization, so as to determine whether the merger and reorganization is significant.

Table 5 Statistical Table of comprehensive scores of merger and reorganization for each sample

sample book	Comprehensive score			
	T-1 Phase	T Phase	T+1 Phase	T+2 Phase
Ningxia building materials	-37.3	-22.25	-11.04	-18.72
Sichuan Shuangma	-36.66	28.95	-16.07	-19.99
Qilian Mountain	3.49	47.82	16.96	8.32
Conch cement	4.03	59.73	36.6	28.95
East Hebei cement	-9.1	9.03	20.21	16.63
Jinyu shares	14.74	50.86	19.85	8.8
Huaxin Cement Company	-51.41	-17.72	26.95	61.13
Jianfeng Group	-31.38	-15.45	31.02	10.97
Upper peak cement	4.16	14.81	27.38	10.26
Hainan Ruize	44.53	19.99	41.48	13.24
Fujian cement	-82.58	-38.72	-13.96	-9.58
Western construction	25.56	56.4	104.87	18.01
Sinoma International	6.13	7.95	66.84	35.41
Rohdea japonica	-2.49	14.95	72.62	83.7
Yatai Group	-21.72	-13.93	-0.74	1.94

Table 6 Mean test of the comprehensive score difference for each phase of the sample

F D-value	F（T）-F (T-1)	F（T+1）-F (T-1)	F（T+1）-F (T)	F（T+2）-F (T-1)	F（T+2）-F (T)	F（T+2）-F (T+1)
Mean of t-test	28.828	21.531	14.703	18.938	3.114	-11.593
Horizontal M & A	36.986	27.546	5.56	13.583	2.597	-2.963
Longitudinal M & A	16.197	67.473	51.277	21.360	5.163	-46.113

From the point of the final comprehensive evaluation results, cement enterprise merger and reorganization, a year after the merger and reorganization, two years after merger and reorganization and the year before the comprehensive score difference are positive, that the cement enterprise merger and reorganization activities have produced a positive synergistic effect, enterprise business performance has improved, the growth of each sample difference, that the research hypothesis is established. Comparing the change in the output value score in the two years before and after merger and reorganization, the average t-test of the score difference in the year of merger and reorganization was 24.828, which showed the most significant performance in the four years before and after merger and reorganization, indicating that the most significant synergistic effect of the overall sample in the year of merger and reorganization.

The operation synergy effect of vertical M&A and reorganization of China's cement listed companies was not obvious in the year of M&A and reorganization, but the operation synergy effect of M&A and reorganization was significant in the second year. It helps to reduce market risks and save transaction costs, so that cement companies can improve

their bargaining power with suppliers such as limestone and coal, as well as buyers such as concreters and builders; at the same time, they can complement the company's original production factors and improve the efficiency of business cooperation.

Suggest

(1) Cement enterprise merger and reorganization must be according to the needs of their own development strategy, structural adjustment, according to the principle of market economy, reduce the government intervention in merger and reorganization behavior, make the enterprise fully responsible for their merger and reorganization behavior, in the longer term, strengthen the strategic integration, organization and management integration, cultural integration, human resources integration and financial asset integration, etc., realize the reasonable allocation of social resources, achieve the maximum synergistic effect, so as to achieve the purpose and goal of merger and reorganization.

(2) As the relationship between China and ASEAN has been upgraded to a "comprehensive strategic partnership", it is imperative for Chinese cement enterprises to "go global" to carry out overseas mergers and acquisitions. While overseas mergers and acquisitions are actively promoted, Chinese enterprises should pay attention to the integration management after mergers and acquisitions. Work, correctly handle the relationship between the local government and the market, promote the mutual penetration and integration of the two cultures, strengthen exchanges and communication, and attach importance to the improvement of the synergistic effect of merger and acquisition management.

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