

# RESEARCH ON INTERACTIVE MECHANISM OF TECHNOLOGY PROGRESS AND M&A

Yongmei Cui, Shengnan Tan and Lian Hong

*Beijing Jiaotong University, Merger and Reorganization of Enterprises in China Research Center, Beijing, China*

**Keywords:** M&A, Technical progress, Interactive mechanism industrial impact hypothesis.

**Abstract:** This paper is based on new growth theory, evolutionary economics and industrial impact hypothesis theoretical basis, Using the mathematical statistics analysis, case analysis, system analysis and inductive method, first respectively expatiates the internal mechanism of technical progress drives M&A and M&A promote technological progress, reveals the interactive of technological progress and the M&A through the establishment of interaction model, then through the comparative analysis of the developed countries 'M&A and technical wave, verifies the positive correlation between the technological progress and M&A, it comes to the conclusion that technical progress is a two-phase dynamic process which contains both technological innovation and technology transfer, in this process, M&A and technical progress exist mutual drive internal mechanism, mainly for technological innovation and transfer make the reallocation of industry resources, which finally drive the M&A waves, then M&A promote the technology innovation and transfer through break the monopoly and concentrate element. The paper is valuable not only in theory but also in practice, which favourable to the establishment of technological progress system and the maturity of the M&A market. Dynamic definition of the technical progress and the establishment of the technical progress and M&A interaction model is the innovation of the article.

## 1 LITERATURE REVIEW

The most contribution to new growth theory which studies the inner mechanism and motivation of economic in a brand new aspect is regarded technical progress as endogenous variable for promoting economic progress. Grossman & Helpman (1991)' horizontal innovation model assumes a certain amount of R&D input can produce certain new products. Evolutionary economics explores neoclassical growth theory. One viewpoint is that the evolution of technology happens along with industry. Industrial impact hypothesis believes every industry is impacted by technology, controlling or economy successively. Tradition M&A motives has been universally acknowledged in the literature (such as potentiation, diversification).Recently many scholar believe that technology progress is one of the driving factor, which has been growing interested in. (Chakrabarti et al., 1994); (Grandstrand et al., 1992); (Hitt et al., 1991); (Gerpot, 1995); (Hagedoorn and Duysters, 2002).

## 2 INTERACTIVE MECHANISM OF TECHNOLOGY PROGRESS AND M&A

### 2.1 The Internal Mechanism of Technology Progress Driving M&A

Luc Soete & Roy Turner (1984), Metcalfe (1988, 1992), (Metcalfe & Michael Gihbotxs, 1989) put forward the evolution model about technology transfer. In the model, the enterprise use a series of technology, which are brought in random and improve by the time. According to the technology life cycle theory, technology goes through a circle process for being developed to replaced, which promote technology progress. In this circle, it can be divided into two phase.

First, rational resource allocation drives M&A. Innovation profit drives the enterprise to innovate, as a result, it sharpens the competition between the enterprises and broke the original economic equilibrium. Second, the motive of acquiring new technology drives M&A. The company won't

survive without adjusting the industrial and produce structure according to its own characteristic and demand, often that adjustment is through M&A. Third, innovation profit provides adequate liquidity.

## 2.2 The Internal Mechanism of M&A Driving Technology Progress

Technology progress driving the M&A, on the country, M&A is also in favor of technology innovation and transfer. Many companies get core technology and knowledge, share advanced experience, and strengthen innovation ability.

First, the enterprise as an organic system, M&A help to technology accumulation which is the core inner factor to success. Second, M&A contributes to intersect and communicate in the internal department of the company. Thirdly, M&A makes the scale of enterprise expand which is the essential condition of scale effect brought by technology progress. Lastly, the industry structure affected by M&A often a perfect macro-environment including talents, capital, labor and policy to technology progress.

## 2.3 The Model of Interactive Mechanism between Technology and M&A

This paper above discusses the Interactive Mechanism of Technology Progress and M&A. As for the whole society, both is a interactive system, just as the chart4 say, technology innovation drive the M&A among the competitive and the inferior to grab resource and technology, it comes to the result that resources flow into progress field, the condition for more R&D is available. And Importing and spreading makes the beneficiary stay on the higher ground to achieve profit. The gather of resource formed by the emergence of the leading industry is good to R&D and reallocate resource, at the same time, the big scale M&A promotes the break of monopoly, interaction of different apartment. That's all facilitation for technology innovation.

In one word, the depth and scope of M&A depends on the degree of technology progress, while all form of also promote technology innovation and spread.

## 3 SOME EMPIRICAL RESEARCH ABOUT TECHNOLOGY PROGRESS AND M&A FROM DEVELOPED COUNTRIES

American's data about labor productivity and M&A growth rate in 1980-2005 indicate that technology positive relation. This paper use correlation coefficient and statistical analysis to prove the relationship (see table 1 below).

Table 1: Correlation coefficient text.

		M&A Amount	
Growth rate of Business sector	Correlation	0.412**	
	t	(0.041)	
Growth rate of none-Business sector	Correlation	0.389*	
	t	(0.055)	
M&A value	Growth rate of M&A Amount	Growth rate of M&A vaule	
	0.370* (0.069)	0.401** (0.047)	0.098 (0.642)
	0.353* (0.083)	0.346* (0.090)	0.073 (0.727)

From the table, M&A amount, M&A value, growth rate of M&A amount and value are all positive, besides the growth rate of M&A amount; other three factors all pass the text.

## 4 RESEARCH CONCLUSIONS

The relationship between technology and M&A is a worthy question. It came to the conclusion below through researching the relationship:

First, technology progress contains both innovation and transfer which represent two phrases of technology cycle mechanism.

Second, technology progress and M&A is positive correlation which express as interactivity. Technology progress promotes M&A, one the country, M&A also promote technology. That exits in the technology cycle mechanism. The depth and scope of M&A depends on the degree of the technology, while all forms of M&A promote the innovation and spread of technology.

## ACKNOWLEDGEMENTS

This paper is funded by the ministry of humanities and social science research (10YJAZH014) and

special fund in basic research projects of Beijing Jiaotong University.

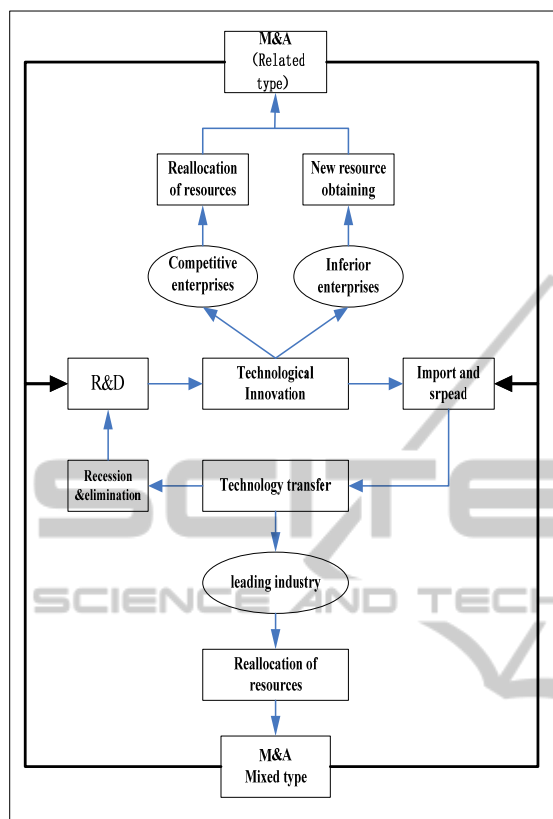


Figure 1.

- Barro, R. J. & X. Sala-I-Martin. *Economic Growth* [J]. *New York: McGraw-Hill*. 1995.
- Gerald Siverberg, Giovanni Dosi & Luigi Orsenigo. Innovation, Diversity and diffusion: A Self Organizing Model[J]. *Economic Journal*. 1988. 98(393):1032-1054.
- Mitchell M. L. and Mulherin J. H. The Impact of Industry Shocks on Takeover and Restructuring Activity[J]. *Journal of Financial Economics*. 1996.41(2):193-229.
- Jovanovic B. and Rousseau P. The Q Theory of Mergers[J]. *American Economic Review*. 2002.92(2):198- 204.
- Andrade G., Mitchell M. and Stafford E. New Evidence and Perspectives on Mergers [J]. *Journal of Economic Perspectives*. 2001.15 (2):103-120.
- Soete Luc and Turner Roy. Technological Diffusion and the Rate of Technical Change[J]. *Economic Journal*. 1984.94(375):612-623.
- Metcalf Stanley. Variety, Structure and Change: An Evolutionary Perspective On the Competitive Process[J]. *Revue D Economie Industrielle*.1992 (59):46-61.
- Ard-Pieter de Man and Geert Duysters. Collaboration and innovation: a review of the effects of mergers, acquisitions and alliances on innovation[J]. *Technovation*. 2005 (25):1377-1387.
- Zheng Deyuan, Li Zhan, Wu Qingsheng. Study on Policy Towards R&D with Two-way Spillovers of Upstream Firms[J], *Journal of Industrial Engineering and Engineering Management*. 2002.16(1).84-85.
- Cui Peijun, Chen Jian, Chen Jixiang, Optimal Spillovers for Cooperative and Noncooperative R&D in Duopoly[J], *Chinese Journal of Management Science*, 2002.10(6).92-96.

## REFERENCES

- J. A. Schumpeter, *Theory of economic development* [M], *Beijing: The Commercial Press*, 1990.73-74.
- Fu Jiayi, *Technological innovation* [M], *Beijing, Tsinghai University Press*, 1998.13-13.
- Liu Yulin, *21th Technological Innovation in China* [M], *Beijing: Peking University Press*, 2001.5-6.
- Chen Ping, *Economic chaos and Evolutionary Economic Dynamics* [M] *Beijing: Peking University Press*, 2004.
- Li Jingwen, *M&A Forum 2007*[M], *Beijing: China Economics Publishing House*, 2007.
- Grossman, G. M. & E. Helpman. *Innovation and Growth in the Global Economy* [J]. *MIT Press*. 1991.
- Agion, P. & P. Howitt, A model of growth through creative destruction [J]. *Econometrica* 1992, 60(2):323-351.
- Caballero, R. J. & A. B. Jaffe. How high are the giant's shoulders [J]. *NEBR Macroeconomics Annual*. 1993.15-74.
- Englmann, F. C. A. Schumpeterian model of endogenous innovation and growth[J]. *Journal of Evolutionary Economics*. 1994.(9):227-241.