The impact of integration strategy on organisational innovation and growth in the global automotive industry

Liang-Hung Lin

Department of International Business
National Kaohsiung University of Applied Sciences
415 Chien Kung Road
Kaohsiung 807, Taiwan, ROC
Fax: +886–7–3830697
E-mail: lhlin@cc.kuas.edu.tw
E-mail: mildlin@yahoo.com.tw

Abstract: The aim of horizontal integration strategies, which often require a mix of Mergers and Acquisitions (M&As), and strategic alliances is ultimately to maximise corporate long-term profits. In recent times, the global automotive industry has developed the use of M&As and alliances far more intensively. Another trend allied to this is the development and adoption of new technologies. This investigation will provide an overview of the major automakers' technological and strategic trends and will examine the impact of integration strategy on organisational innovation and growth. Longitudinal data were collected over the 2002 to 2006 period. Regression analyses revealed that horizontal M&As were negatively related to both innovation and growth. Strategic alliances were negatively related to innovation, but positively related to growth. Furthermore, Multidimensional Scaling (MDS) analyses indicated that M&As in the auto industry also increased the degree of industrial consolidation in the global market.

Keywords: Mergers and Acquisitions; M&As; strategic alliances; technological innovation; organisational growth; auto industry.

Reference to this paper should be made as follows: Lin, L-H. (2009) 'The impact of integration strategy on organisational innovation and growth in the global automotive industry', *Int. J. Automotive Technology and Management*, Vol. 9, No. 1, pp.54–68.

Biographical notes: Liang-Hung Lin is currently an Assistant Professor at the Department of International Business, National Kaohsiung University of Applied Sciences, Taiwan, ROC. He is interested in the fields of technology management, strategic management and organisational management. He has published academic papers in the *Journal of Organizational Change Management*, the *International Journal of Human Resource Management*, the *International Journal of Technology Management* and *Total Quality Management and Business Excellence*.

1 Introduction

Different integration strategies demonstrate entirely different effects on firms' technology development and growth. Implementing technological cooperation with competitors could help establish technical standards and ensure the usage of standardised components to reduce costs. However, this does not seem to facilitate innovations in the automotive industry because cooperators usually protect their own technologies in cooperative R&D projects. As to acquiring new technology from buying other firms, it is not surprising that Mergers and Acquisitions (M&As) could not help advance new technologies and products since many studies have reported the high possibility of failure in actual takeovers (Burgers *et al*., 1993; De Man and Duysters, 2005). In order to test the effects of M&As and strategic alliances on automakers' long-term performance, this paper provides an overview of the technological and strategic trends in the industry and examines the impact of M&As and strategic alliances on organisational innovation and growth.

The contents of this study are organised as follows. Section 2 introduces the possible positive and negative effects of M&As and strategic alliances on organisational innovation and growth from the previous literature. Sections 3 and 4 then draw the trends in auto technology development and big automakers' horizontal integration strategies. Next, Sections 5 and 6 test the effects of M&As and strategic alliances on the global automotive industry. Section 7 finally derives some main conclusions and presents concluding remarks.

2 Literature review and research hypotheses

2.1 *Effects of mergers and acquisitions*

The use of an extended study period for this work is important in M&A studies in order to integrate strategic, organisational and environmental perspectives. As to the inconsistency in the M&A-performance relationship, one important point is that any single acquisition for large firms is merely a small part of a longitudinal sequence of acquisitions. Thus, the integration mechanism must play a crucial role in the M&A process. However, at least in the short term, the integration of M&As are unavoidably imperfect; as a result, M&A performance often tends to be worse than expected for at least some time (Gulati and Singh, 1998; Schijven, 2005). First of all, acquisitions usually entail high transaction costs (*e.g.*, negotiating cost, bidding cost and monitoring cost). This results in acquirers not being able to realise profits from their acquisitions (Hitt *et al*., 1996). One of the important transaction difficulties is the "bounded rationality" (Jones, 2004) that explains the high complexity and uncertainty within acquisition negotiations (*e.g.*, managers do not know the actual situations of firms in other industries). Acquirers may not easily predict the potential gains between the acquiring and acquired firms' assets. This uncertainty may lead to problems in integration processes and harm innovation efforts because the perceived economies of scale may be far lower than anticipated. Another negative effect is that the acquisition processes usually absorb a high level of management's time and energy. M&As require extensive preparations, negotiations, analyses and evaluations. During this process, the attention of top managers may be diverted from internal activities such as developing new products and innovative technologies (Hitt *et al.*, 1990), at least in the short turn. Thus, this study expects that:

H1 *There is a negative relationship between M&A and technological innovation.*

H2 *There is a negative relationship between M&A and organisational growth.*

2.2 *Effects of strategic alliances*

Strategic alliances positively affect organisational performance on the market share and growth in most industries in the previous researches (*e.g.*, Hitt *et al.*, 1996; 2004; Hill, 2006); however, the impact of alliances on technological innovation still remains unclear. Strategic alliances may enhance technological innovation because cooperative agreements can ease a number of transactional costs (Jarillo, 1988). Furthermore, a low risk of large Research and Development (R&D) projects and the integration of complementary resources also promote innovation through strategic alliances (De Man and Duysters, 2005). However, alliances may also negatively affect technological innovation when the communication of information and knowledge across organisations is hindered or difficult. Conflicts in different organisational cultures and control mechanisms also impede the transition of knowledge (Lane and Lubatkin, 1998). Perhaps the most important reason for the failure of alliances is that the partners in strategic alliances remain competitors. Thus, collaborators usually hold back a trick or two in cooperative R&D projects because each partner is afraid of helping his competitors develop new technologies and competitive advantages (Larson and Gobeli, 1988). When alliance partners come from the same industry, it may not be advantageous for organisations to provide the best R&D engineers, advanced technologies and know-how to the alliance. Thus, the decision to develop new technologies independently or cooperate with competitors has become of crucial strategic importance for top managers. Technological alliances will not succeed unless excellent interorganisational cooperation mechanisms and sufficient trust among alliance partners exist (Larsson *et al.*, 1998; Schilling, 2005). Thus, this study expects that:

H3 *There is a negative relationship between strategic alliances and technological innovations.*

H4 *There is a positive relationship between strategic alliances and organisational growth.*

3 Trends of auto technology development

There is no disagreement that safety belts, the Anti-lock Braking System (ABS) and air bags are the three most important technologies in the history of the automobile. Along with inventions for convenience and safety purposes, energy-saving technologies may become the most important innovations in the future. According to several scientific investigations, supplies of petroleum and natural gas will be exhausted within 40 years (Jeffe *et al*., 2002). Internal combustion engines will be replaced by cleaner advanced engineering technologies in two or three decades. As environmental protection awareness increases, major automakers keep developing their eco-car and energy replacement plans.

3.1 Energy-saving technologies and government regulations

Pure Electrical Vehicles (PEVs) are an ideal solution to gasoline shortages; however, the source of electric power and the insufficient range are unsolved issues for PEVs. Thus, hybrid technology provides another feasible solution. While any car is a hybrid vehicle if it combines more than one sources of power, hybrid vehicles usually provide a rechargeable battery and a gasoline engine. Hybrid cars are built with smaller gasoline engines to supply most usage on flat roadways or driving at regular speeds while using battery electricity to provide extra power when needed. Furthermore, hybrid cars can often collect braking thermal energy and use it to charge the battery. The Toyota Prius was launched in Japan in 1997, where sales reached 18 000. At the same time, PEVs such as Ford's Ranger pickup, Honda's EV Plus, Toyota's RAV4 EV and GM's EV1 were launched in the USA. Despite early expectations, PEVs failed to attract sufficient interest; the programmes were discontinued as hybrids became fashionable. Honda's Insight was first to market in the USA, which was followed by the Prius in 2000. Two years later, Honda released its Civic Hybrid and Toyota again responded with Prius II in 2004, which was launched onto the global market.

Besides energy-saving technologies, governments and organisations have driven the concept of sustainable development by setting treaties and regulations in the international business environment. For example, EU approved the Waste Electrical and Electronic Equipment Directive (WEEE) in 2002 and passed the Restriction of Hazardous Substances in Electrical and Electronic Equipments (RoHS) in 2006. The major targets of the WEEE/RoHS regulations are the producers, sellers, distributors and recyclers of electronics and electrical products. It regulates the organisations above to be responsible for the disposal of waste and the limit of hazardous substances. Thus, these regulations will change design, R&D and production management for the related industries.

Moreover, the emission control regulation is another regulation for the global automotive industry (Lee *et al*., 2004). The supporters of government regulation claim that severe environmental regulations provide incentives for automakers to advance less costly ways of reducing pollutants (Jeffe and Palmer, 1997; Jeffe *et al*., 2002). Innovation management for the auto emission control system is more complex than the previous cases of chlorofluorocarbon (CFC) and SO2 phase-out for electric companies. For the targeted air emission in the auto industry, HC, CO, and NO_x should be firstly discussed. For the actual government intervention and regulation for the emission control system in different countries, there is a need for the automakers to collect and analyse the associated laws in different countries. For example, the relevant laws in the USA are the 1970 Clean Air Act (1970CAA), 1977 Clean Air Act Amendments (1977CAAA), 1990 Clean Air Act Amendments (1990CAAA) and 1998 National Law Emission Vehicle Program (NLEV).

3.2 Automotive telematics technologies

The term 'telematics' consists of the words telecommunication and informatics, which indicates long-distance message services and wireless numerical communication systems. More precisely, telematics technologies integrate motor technologies, computer operation capabilities and wireless communication technologies and wish to provide drivers with convenient communication channels and entertainment platforms on the road. According to a report by the US Department of Transportation (DOT), people all over the world have to spend more than half a billion hours in a single week to commute using public or private transportation. People want entertainment, to chat with their friends or even to complete unfinished work. At a minimum, drivers wish to stay connected when they are caught in traffic jams. In fact, the big automakers have enhanced various products to meet consumer demand, which include radios, Global Positioning Systems (GPS) and DVD players. The major purposes for the development of telematics technologies are to help drivers adopt navigation systems to shorten their travel time and increase driving safety by providing a friendly and relaxed driving enviroment.

However, telematics products in the initial stage faced two major challenges. On the one hand, all the old-type telematics used closed systems, independent hardware and fixed usage interfaces, which prohibit communicating from different brands of motors. On the other hand, the older telematics do not provide functions to link up with consumer electronics, such as Mobile phones, Personal Digital Assistants (PDAs) and MP3 players. To a certain extent, these concerns have limited telematics' convenience and popularisation. Beyond its success in PC technical standards (Wintel), Microsoft now desires to unify disordered motor telematics systems (Pringle, 2002; Hill *et al*., 2004). The Microsoft Automotive Business Unit (Microsoft ABU) is a new motor department of Microsoft that focuses on the development of the Microsoft Telematics Platform, which seeks to integrate the standards of motor electronics, consumer electronics and the internet. Containing hardware (the Telematics Box) and software (Windows Automotive), this platform can be useful in different brands of automobiles and consumer electronics. Under the assumption of a unistandard, big automakers desire to improve technologies concerning remote control, Bluetooth and voice control in order to utilise new information and communication technologies.

4 Big automakers' horizontal integration strategies

A horizontal strategy, which contains M&As, seems to be a useful corporate-level strategy (Hitt *et al*., 1996). In most industries, such as automotive, pharmaceutical and computer industries, numerous integration cases have increased the degree of industrial consolidation. International companies implement a horizontal strategy, usually owing to the reported benefits of reducing costs, adding product value, avoiding price wars and increasing bargaining power (Hoskisson *et al*., 1991). However, this strategy may not be a panacea in all industries. Considering automakers' present horizontal integration strategy implementation and technology development, this paper exhibits data and explains the trends of strategic cooperation.

In order to increase market share and pursue economies of scale, international automakers have hastened to forge alliances with other firms (Bettis and Hitt, 1995). In 2000, only GM reached a threshold of manufacturing five million cars in one year. However, Toyota, VW, Ford and Nissan had jointed this so-called 'five million club' in 2002 (2006 GM annual report). The most representative case of international corporate mergers may be the contract signed by Jurgen Schrempp and Bob Eaton on 7 May 1998; unfortunately, both Mercedes Benz and Chrysler faced serious problems of acclimatisation in recent years. In comparison with numerous brands owned by GM and Ford, Toyota only holds three extensive brands (Lexus, Scion and Daihatsu). The sales of each brand in the Toyota group increased from 2001 to 2005 (see Table 1), allowing Toyota's market capitalisation to reach a peak of USD $176 billion, which exceeds the total sum of the other five major motor groups.

Table 1 The major global motor groups' sales from 2001 to 2006

Annual sales/ Million cars	*GM*	*Toyota*	*Ford*	*Renault-Nissan*	*VW*	*DaimlerChrysler*
2001	8.1	4.7	4.6	4.3	4.2	3.5
2002	8.4	5.8	7.0	5.1	5.0	4.1
2003	8.1	6.2	6.7	5.4	5.0	3.9
2004	8.2	6.5	6.8	5.8	5.1	3.9
2005	9.2	7.4	6.8	6.1	5.2	4.0
2006	9.2	9.1	6.0	6.1	5.7	4.5

Source: United Nations Industrial Development Organization (UNIDO) (2006)

4.1 Entering the Chinese market

After the USA and Japan, China became the world's third largest auto market in 2004 and it continues to grow. Experts predict that China's demand for automobiles will hit 6.9 million units in 2006 and that the figure will exceed 10 million by 2010. Global automakers are excited about this young, mostly untapped market where consumers' tastes are just taking shape. As a major emerging market for the global automotive industry, China's automakers have become the most significant cooperators for international auto groups in the 21st century. For example, First Automotive Works (FAW) cooperates with the VW group by joint venture and joint production, Guangzhou Automobile cooperates with Toyota by joint venture, the Shanghai Automotive Industry Corporation (SAIC) cooperates with VW and GM by joint venture and technological cooperation, Nanjing Automobile cooperates with Fiat and GM by joint venture, Changan Automobile cooperates with Ford by joint venture and Dongfeng Motor Corporation cooperates with Nissan by joint venture and joint production. Most global brands wish to cooperate with China's domestic automakers in order to gain a beachhead in this immense market. The global auto groups are exhibited in Table 2, including China's major brands. About 12 years ago, VW, Audi, Skoda and Seat Motors began to develop a common chassis in their sedans. Furthermore, different groups like GM and Toyota are preparing to improve their hybrid engines together. Cross-group technological cooperation is another recent trend.

Table 2 The major global auto groups in 2006

Motor group	*GM*	*Toyota*	*Ford*	*Renault-Nissan*	*VW*	*DaimlerChrysler*	*PSA*	*Honda*	*Fiat*	*BMW*
Sales in 1994 (million cars)	7.7	4.1	6.2	2.1/2.7	2.9	0.8/2.3	2.5	1.7	2.0	0.4
Sales in 2005 (million cars)	9.2	7.4	6.8	6.1	5.2	4.0	3.4	3.2	1.7	1.3
Sales change percentage	19.4%	80.4%	9.7%	27.1%	79.3%	29.0%	36%	88.2%	–15%	225.0%
2006 Market capitalisation (billion dollars)	12.0	176.0	14.6	54.5	28.0	57.9	11.7	56.0	11.2	24.9
Brands owned (2006)	Buick Chevrolet Cadillac GMC Hummer Opel Pontiac Saab Saturn Vauxhall Daewoo	Toyota Lexus Scion Daihatsu	Ford Mazda Aston Martin Jaguar Lincoln Land Rover Mercury Volvo	Renault Nissan Infiniti Dacia Samsung	VW Audi Bugatti Lamborghini Bentley Seat Skoda	Chrysler M. Benz Dodge Jeep Maybach Smart	Peugeot Citroen	Honda Acura	Fiat Alfa Romeo Ferrari Lancia Maserati MG	BMW Mini Rolls Royce
Technological cooperation with major auto groups (2006)	DaimlerChrysler Toyota Fiat	GM	PSA	PSA	DaimlerChrysler	BMW GM VW	Ford Renault BMW	–	GM	DaimlerChrysler PSA
Manufacturing cooperation with major auto groups (2006)	Renault	PSA	VW Fiat	Hyundai	Ford		Toyota	–	Ford	
Joint venture with China's automakers	SAIC, Nanjing	Guangzhou FAW	Changan	Dongfeng Motor Corporation	FAW SAIC	Beijing	–	Guangzhou	Nanjing	Brilliant

Source: United Nations Industrial Development Organization (UNIDO) (2006)

4.2 Changes of automotive alliance subnetworks from 1994 to 2006

The ecological distribution of the auto industry has changed greatly in the last decade. To clarify the changing trends of auto groups, firms' alliances and industrial subnetworks, this study collected and analysed data from 1994 and 2006 from the UNIDO, Moody's Investors Service and the world's car manufacturers. In 1994, the sample is made up of the 23 largest global companies in the car market (see Table 3). This study excluded the automakers operating only in local markets, since they neither affect nor were affected by global competition. After industrial M&As, there remains only 15 global companies in 2006 that includes 11 auto groups (GM, Toyota, Ford, Renault-Nissan, VW, DaimlerChrysler, PSA, Hyundai, Honda, Fiat and BMW) and four independent companies (Suzuki, Mitsubishi, MG Rover and Porsche). Considering the rapid development of China's auto market, the 2006 sample is made up of these 15 global car makers plus China's top three auto makers: SAIC, FAW and Dongfeng Motor Corporation.

Table 3 The 1994 and 2006 samples of global auto companies

1994 sample	*Symbol*	*2006 sample*	*Symbol*
General Motors	GM	General Motors	GM
Ford	FOR	Toyota	TOY
Toyota	TOY	Ford	FOR
Volkswagen	VW	Renault-Nissan	R_N
Nissan	NIS	Volkswagen	VW
Peugeot Citroen	PSA	DaimlerChrysler	D_C
Chrysler	CHR	Peugeot Citroen	PSA
Renault	REN	Hyundai	HYU
Fiat	FIA	Honda	HON
Honda	HON	Fiat	FIA
Mazda	MAZ	BMW	BMW
Mitsubishi	MIT	Suzuki	SUZ
Suzuki	SUZ	Mitsubishi	MIT
Daimler-Benz	BEN	MG Rover	ROV
Hyundai	HYU	Porsche	POR
Daihatsu	DAI	Shanghai*	SAIC
Subaru	SUB	First*	FAW
Isuzu	ISU	Dongfeng*	DMF
Rover	ROV		
Volvo	VOL		
BMW	BMW		
Daewoo	DAE		
Porsche	POR		

Note: * China's automakers.

To clarify the changes in auto ecological distribution, it is necessary to distinguish the subnetworks within the industry network. Following the work of Burgers *et al*. (1993), this study determined for each firm its distance to all other firms with a determination of the number of linkages (technological cooperation and/or manufacturing cooperation) contained in the geodesic between each pair of automakers (Freeman, 1979). A geodesic is a measure of distance referred to the shortest path by which a pair of organisations link. A geodesic contains one link (distance = 1) if the two automakers are directly related, two links (distance = 2) if two firms are indirectly linked via one other firm to which both are linked and so forth. The data matrix illustrates paired distances as the initial dissimilarity measures. Next, Multidimensional Scaling (MDS) was used to present the distribution of all companies by their alliances and cooperation within the auto industry. Applying the Alternative Least Square Scaling (ALSCAL) procedure in SPSS, the two-dimensional MDS solutions are shown in Figure 1 (1994) and Figure 2 (2006). Finally, cluster analysis was applied to determine the solution of subnetworks within the industry (Johnson and Wichern, 1992). Three clusters were determined in both the 1994 and 2006 data, as shown in Figures 1 and 2.

Figure 1 The global auto strategic alliances in 1994

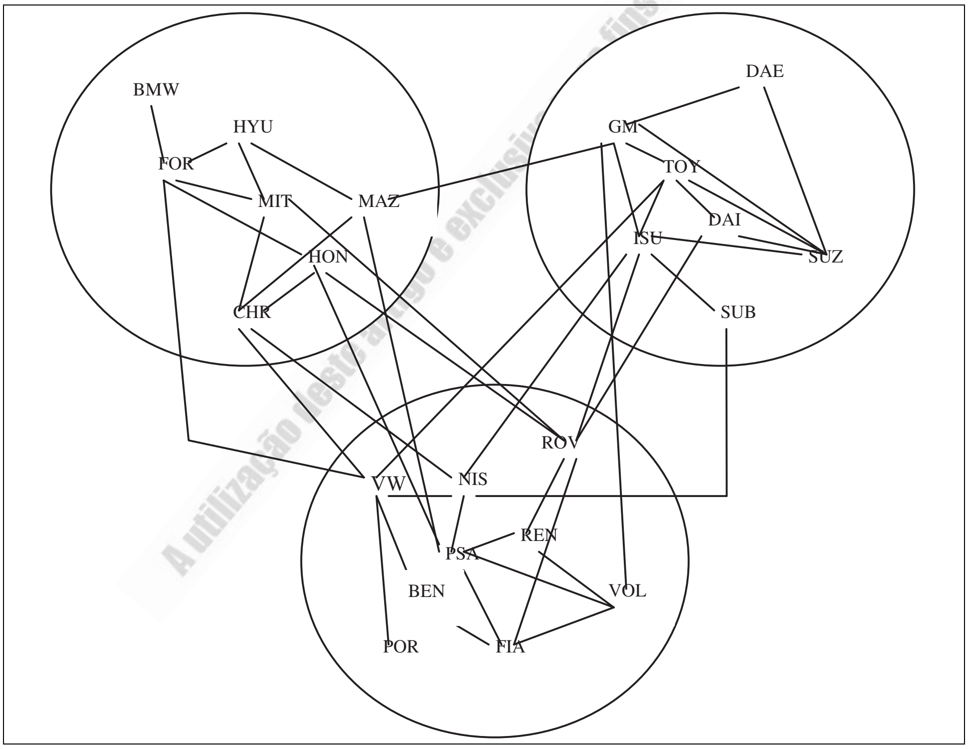
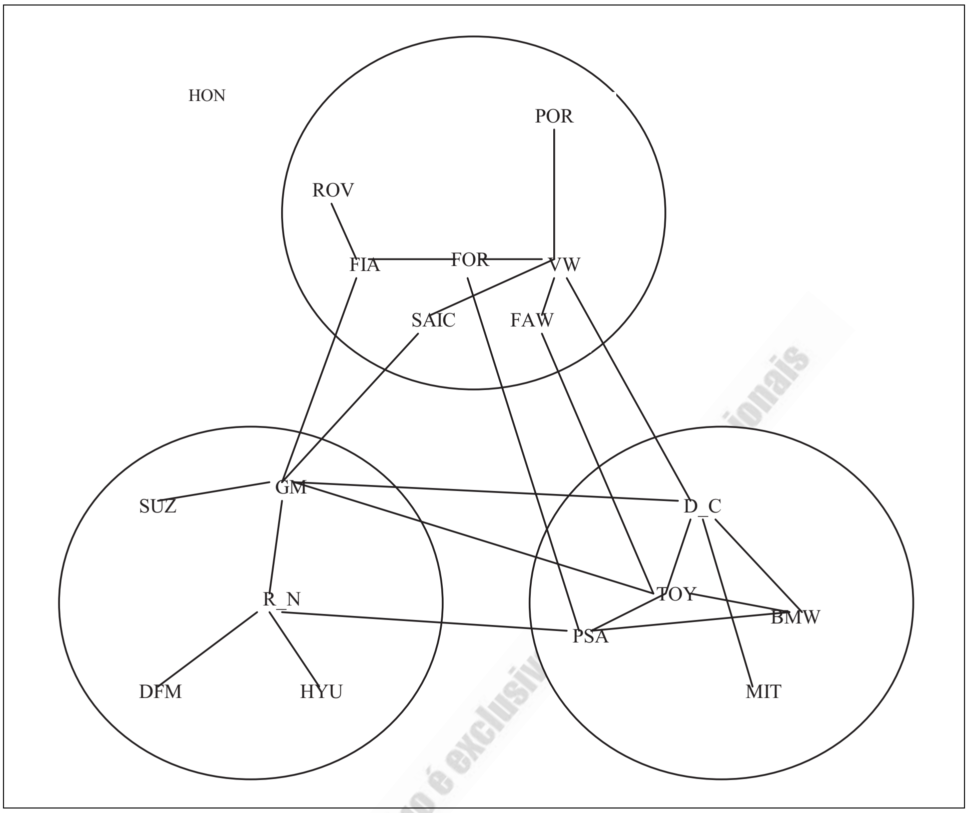


Figure 2 The global auto strategic alliances in 2006



5 Methods

5.1 Sample and data

This study conducted an empirical investigation to test the effects of M&As and strategic alliances on organisational innovation and growth in the global automotive industry. The sample contains the top ten global car groups (GM, Toyota, Ford, Renault-Nissan, VW, DaimlerChrysler, PSA, Honda, Fiat and BMW; see Table 2) from 2002 and 2006. We have 50 observations in five years. Data were collected from UNIDO, the Initial Quality Study (IQS) of JD Power and Associates the US Patent and Trademark Office (USPTO), the European Patent Office (EPO), the World Intellectual Property Organization (WIPO), Moody's Investors Service and the world's car manufacturers.

5.2 Dependent variables

5.2.1 Technological innovation

As an important proxy indicator for technological innovation in the global automotive industry (*e.g.*, Sasaki, 1991; Takeishi, 2001; Lin and Lu, 2006), this study adopts patents as the measure of technological innovation for the automakers. Data were collected from the USPTO, the EPO and the WIPO. For a car group containing several companies, only the dominant automaker's patents were included because small auto firms are sometimes owned by different dominant automakers in different years.

5.2.2 Organisational growth

The growth of an organisation was measured as the sales growth rate for each year. Data were available from UNIDO, Moody's Investors Service and the world's car manufacturers.

5.3 Independent variables

5.3.1 Mergers and acquisitions

M&As were operationally defined using a number of M&As completed in each year. Data were collected from UNIDO and Moody's Investors Service.

5.3.2 Strategic alliances

According to the trends of big automakers' horizontal integration strategies, strategic alliances for the global auto industry should be divided into three parts:

1. technological cooperative partners – that measure the number of alliance partners for developing new technologies
2. manufacturing cooperative partners – that refer to the number of alliance partners only for manufacturing and assembling new cars
3. Chinese cooperative partners – that refer to the number of cooperative partners in the Chinese market. Data were extracted from Moody's Investors Service and the world's car manufacturers.

5.4 Control variables

5.4.1 R&D expenditure

This variable measures investment and expenditures on R&D facilities, New Product Development (NPD) projects and all invention-related activities. Data were collected from UNIDO.

6 Findings

Table 5 presents a series of regression models associated with technological innovation and organisational growth. In the regression results of patents, only R&D expenditure ($b = 0.61$, $p < 0.01$) was significantly positive related to the patents issued by car groups. Integration strategies containing M&As ($b = -0.53$, $p < 0.05$) and technological cooperation ($b = -0.39$, $p < 0.05$) were significantly negative related to patent generation. Thus, Hypotheses 1 and 3 were supported in this study. Furthermore, in the regression results of growth, R&D expenditure was not influential in the model. However, M&As and strategic alliances had different impacts on growth. On the one hand, M&As were significantly negative related to organisational growth ($b = -1.24$, $p < 0.01$). On the other hand, technological cooperation ($b = 0.59$, $p < 0.05$), manufacturing cooperation ($b = 0.58$, $p < 0.1$) and Chinese cooperation ($b = 0.85$, $p < 0.01$) were all positively related to organisational growth. Thus, Hypotheses 2 and 4 were supported in this study.

Table 4 The correlation matrix

Variable	*1*	*2*	*3*	*4*	*5*	*6*
1 Patent						
2 Growth	.23					
3 R&D expenditure	.40**	–.13				
4 M&A	–.46***	–.34**	.32*			
5 Technological cooperator	–.41**	.33*	.05	.30		
6 Manufacturing cooperator	.04	–.27	.26	.45**	–.62**	
7 China cooperator	.13	.32	.55**	.20	.29	.11

Notes: Two-tailed tests, $n = 50$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5 The results of regression analyses

Dependents	*Patent*		*Growth*	
	b	*t*	*b*	*t*
Independent variables				
R&D expenditure	.61	4.48***	–.06	–.48
M&A	–.53	–1.91**	–1.24	–4.31***
Technological cooperation	–.39	–1.88**	.59	1.98**
Manufacturing cooperation	–.13	–.39	.58	1.78*
Chinese cooperation	.08	.49	.85	5.29***
R^2	.79		.78	
F-value	7.85***		7.64***	

Notes: Two-tailed tests, $n = 50$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Other MDS findings in Figures 1 and 2 also revealed some interesting results. Firstly, the M&As in the auto industry have increased the degree of industrial consolidation in 2006. In 1994, there were 23 global companies in the car market. After industrial M&As, there remained only 15 global companies in 2006 that contains 11 auto groups and four independent companies. For example, Chrysler and Mercedes-Benz merged (DaimlerChrysler) in 1998 then bought Mitsubishi in 2000 and sold it in 2003, Hyundai bought Kia in 1999, Ford bought Mazda and Volvo in 1999, Renault bought Nissan in 2000 and GM sold Suzuki in 2006. MG Rover is a particular example. In 1995, the Land Rover was sold to BMW and a 17-year cooperation with Honda ended. In 2000, Land Rover was sold by BMW to Ford; the new Mini was launched by BMW and the remainder of company was renamed MG Rover Ltd. In 2005, Nanjing Automobile (China) acquired the entire assets of MG Rover. Big automaker groups own many brands in the global market (*e.g.*, GM owns Buick, Chevrolet, Cadillac, GMC, Hummer, Opel, Pontiac, Saab, Saturn, Vauxhall and Daewoo; Ford owns Mazda, Aston Martin, Jaguar, Lincoln, Land Rover, Mercury and Volvo).

In addition, automobile subnetworks have entirely changed from 1994 to 2006. The 1994 data could distinguish three major groupings: two US-Japan subnetworks and a European subnetwork joined by Nissan (Hitt *et al*., 1996; Burgers *et al*., 1993; see Figure 1). From Figure 2 in 2006, however, the European subnetwork was replaced by a new European-Japan grouping that contains BMW, Mitsubishi, Toyota, PSA and DaimlerChrysler. The two US-Japan subnetworks were replaced by two global groupings that contain companies from the USA, Europe, Japan, South Korea and China. In 1994, the collaborative centres (direct links >= 6) were GM, VW, Isuzu, PSA and Land Rover. But in 2006, VW, GM, Toyota and DaimlerChrysler were more active (direct links >= 5) in this industry. Honda owned four direct links in 1994; however, it recently developed its technology by itself.

7 Conclusions

Although the implementation of strategic M&As may be beneficial to capture market share, it may not support or favour new technology development and innovation. In fact, the strategies of M&As and alliance have entirely different effects on innovation and growth. The negative effect of M&As on both innovation and growth also echoes the prospect of failure in takeovers. Strategic alliances have an opposite effect on innovation and a positive effect on growth. This finding also implies the necessity for top managers to make the choice between emphasising organisational innovation or growth on sales. If top managers choose emphasising growth on sales, they should implement more strategic alliances with other automakers because alliance is helpful in increasing the market share in foreign countries. Conversely, if top managers choose emphasising innovation, they should implement more R&D activities by themselves and try to protect their technological patents. Particularly when undertaking R&D cooperation with competitors, it may be harmful to their own crucial technologies because competitors usually try to learn valuable knowledge and know-how from alliance partners. However, alliances also enhance firms' growth, especially when cooperating with China's automakers. As a major emerging market for the global automotive industry, China's automakers have become the most popular cooperators for international auto groups in the 21st century. This study verifies the importance of this largest auto market in the future.

Horizontal integration is not necessary to create benefits, although value-adding is proposed to be one of its advantages. Empirical investigations also showed that more than 31% of M&As cases suffered decreased corporate value, while only 30% of them increased in value. The reasons for takeover failure include extremely conflicting organisational cultures, hostile acquisition, the loss of professionals in the firms which are taken over, the underestimation of the associated costs and the overestimation of the benefits of integration. A firm's decision to outsource or self-produce has different influences due to different strategic choices concerning technology acquisition. Implementing technological cooperation with competitors could help establish technical standards and ensure the usage of standardised components to reduce costs. However, this does not seem to facilitate critical organisational technology and patents in the automotive industry. Acquisitions, mergers, takeovers and all operations of vertical and horizontal integrations must consider the cultural impacts. Organisational culture, while consisting of stable and lasting traits, could help managers in describing, explaining and predicting the behaviours and attitudes of associated members and, finally, help decrease the conflicts caused by strategic actions.

References

Bettis, R.A. and Hitt, M.A. (1995) 'The new competitive landscape', Special issue, *Strategic Management Journal*, Vol. 16, pp.7–19.

Burgers, W.P., Hill, C.W.L. and Kim, W.C. (1993) 'A theory of global strategic alliances: the case of the global auto industry', *Strategic Management Journal*, Vol. 14, pp.419–432.

De Man, A. and Duysters, G. (2005) 'Collaboration and innovation: a review of the effects of mergers, acquisitions and alliances on innovation', *Technovation*, Vol. 25, pp.1377–1384.

Freeman, L. (1979) 'Centrality in social networks: conceptual clarification', *Social Networks*, Vol. 1, pp.215–239.

Gulati, R. and Singh, H. (1998) 'The architecture of cooperation: managing coordination costs and appropriation concerns in strategic alliances', *Administrative Science Quarterly*, Vol. 43, pp.781–814.

Hill, C.W.L. (2006) *International Business: Competing in the Global Marketplace*, New York: McGraw-Hill.

Hill, C.W.L., Jones, G.R. and Galvin, P. (2004) *Strategic Management: An Integration Approach*, Australia: John Wiley & Sons.

Hitt, M.A., Hoskisson, R.E. and Ireland, R.D. (1990) 'Mergers and acquisitions and managerial commitment to innovation in M-form firms', *Strategic Management Journal*, Vol. 11, pp.29–47.

Hitt, M.A., Hoskisson, R.E., Johnson, R.A. and Moesel, D.D. (1996) 'The market for corporate control and firm innovation', *Academy of Management Journal*, Vol. 39, No. 5, pp.1084–1119.

Hoskisson, R.E., Hitt, M.A. and Hill, C.W.L. (1991) 'Managerial risk taking in diversified firms: an evolutionary perspective', *Organization Science*, Vol. 3, pp.296–314.

Jarillo, J.C. (1988) 'On strategic networks', *Strategic Management Journal*, Vol. 9, No. 1, pp.31–41.

Jeffe, A.B., Newell, R.G. and Stavins, R.N. (2002) 'Environmental policy and technological change', *Environmental and Resource Economics*, Vol. 22, pp.41–54.

Jeffe, A.B. and Palmer, K. (1997) 'Environmental regulation and innovation: a panel data study', *The Review of Economics and Statistics*, Vol. 79, No. 4, pp.610–619.

Johnson, R. and Wichern, D. (1992) *Applied Multivariate Statistical Analysis*, New Jersey: Prentice Hall.

Jones, G.R. (2004) *Organizational Theory, Design, and Change*, New Jersey: Pearson.

Lane, P.J. and Lubatkin, M. (1998) 'Relative absorptive capacity and inter-organizational learning', *Strategic Management Journal*, Vol. 19, pp.461–477.

Larson, E.W. and Gobeli, D.H. (1988) 'Organizing for product development projects', *Journal of Product Innovation Management*, Vol. 5, pp.180–190.

Larsson, R., Bengtsson, L., Henriksson, K. and Sparks, J. (1998) 'The interorganizational learning dilemma: collective knowledge development in strategic alliances', *Organization Science*, Vol. 9, pp.285–305.

Lee, J., Veloso, F., Hounshell, D.A. and Rubin, E.S. (2004) 'Innovation in automotive emission control technologies: government actions and inventive activities', *The Academy of Management Proceedings*, pp.F1–F6.

Lin, L.H. and Lu, I.Y. (2006) 'Product quality as a determinant of product innovation: an empirical analysis of the global automotive industry', *Total Quality Management and Business Excellence*, Vol. 17, No. 2, pp.141–147.

Pringle, D. (2002) 'Wintel duo targets the cellphone', *Wall Street Journal*, 19 February, pp.E1–E2.

Sasaki, T. (1991) 'How the Japanese accelerated new car development', *Long Range Planning*, Vol. 24, No. 1, pp.15–25.

Schijven, M. (2005) 'Curing the firm's indigestion: organizational restructuring and the dynamics of acquisition performance', *Academy of Management Best Conference Paper*, pp.M1–M6.

Schilling, M.A. (2005) *Strategic Management of Technological Innovation*, New York: McGraw-Hill.

Takeishi, A. (2001) 'Bridging inter- and intra-firm boundaries: management of supplier involvement in automobile product development', *Strategic Management Journal*, Vol. 22, pp.403–433.

United Nations Industrial Development Organization (UNIDO) (2006) 'Moody's investors service and the world's car manufacturers', http://www.unido.org.lb/.

Bibliography

Amabile, T.M., Conti, M.R., Coon, H., Lazenby, J. and Herron, M. (1996) 'Assessing the work environment for creativity', *Academy of Management Journal*, Vol. 39, No. 5, pp.1154–1184.

Damanpour, F. and Gopalakrishnan, S. (2001) 'The dynamics of the adoption of product and process innovations in organizations', *Journal of Management Studies*, Vol. 38, pp.45–65.

Hamel, G. (1991) 'Competition from competence and interpartner learning within international strategic alliances', *Strategic Management Journal*, Vol. 12, pp.83–103.

Hofstede, G. (1991) *Cultures and Organizations: Software of the Mind*, London: McGraw Hill.

Hofstede, G. (1994) 'Management scientists are human', *Management Science*, Vol. 40, No. 1, pp.4–13.

Pothukuchi, V., Damanpour, F., Choi, J., Chen, C.C. and Park, S.H. (2002) 'National and organizational culture differences and international joint venture performance', *Journal of International Business Studies*, Vol. 33, No. 2, pp.243–265.

Stevenson, W.J. (2002) *Operations Management*, New York: McGraw-Hill.

Tushman, N.L. and Nelson, R.N. (1990) 'Technology, organizations and innovation: an introduction', *Administrative Science Quarterly*, Vol. 35, pp.1–8.

LIN, Liang-Hung. The impact of integration strategy on organisational innovation and growth in the global automotive industry. **International Journal of Automotive Technology and Management**, V. 9, n. 1, 2009, p. 54 - 68. Disponível em: www.inderscience.metapress.com. Acesso em: 18 nov. 2009.