

Taiwan's bicycle industry A-Team battles Chinese competition with innovation and cooperation

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The People's Republic of China (China) has become a workshop to the world, and manufacturing there is increasingly moving beyond labor intensive, low value-added products. As a result, China poses a severe competitive challenge to companies in many industries around the world. For such companies, the recent successes of the bicycle industry in the Republic of China (Taiwan) may provide at least some reason for hope.

Broadly speaking, Taiwan's previous economic success has been built on the competitiveness of its small and medium sized enterprises, and competition among such companies has tended to be high. Such firms have shown a remarkable ability to recombine and form new networks in line with market changes. We call such networks "modular, symbiotic supplier networks" and, during the 1980s and early 1990s, they created competitive advantage for the island nation by virtue of their ability to support rapid product development.

Without the openness and task specialization brought about by globalization and an extensive use of modularity, little advantage would have been gained. Such openness and modularity, however, have been something of a two-edged sword. Toward the end of the 1990s, many of the capabilities traditionally associated with Taiwanese manufacturing excellence could also be seen in the Yangtze River and Pearl River Delta areas of China. With each region forming an ever larger industrial cluster, such areas are gradually taking over the position that Taiwan has traditionally held in the international division of manufacturing activities, and the island's industrial development has come under significant pressure.[1] Despite the difficult competitive environment, Taiwan's bicycle industry presents an interesting case of how established producers may persevere in the face of strong challenges by low cost competition.

Taiwan's two leading bicycle assemblers are Giant and Merida. Both are publicly listed, have brand names that are known around the world, and are devoted to sustaining Taiwan's competitiveness in the bicycle industry. Over the years, these rival firms have treated each other respectfully, and in 2005 they accounted for about 50 percent of all Taiwanese annual bicycle production. In contrast, most local bicycle industry suppliers are small to medium sized companies. Typically, such companies have few resources for innovation. Moreover, they have received little support in enhancing their technological capabilities from local assemblers, which commonly purchase key components directly from more advanced foreign countries.

The 1990s were a golden era for the industry, with annual exports totaling around 10 million units; but since then, annual exports have steadily declined in the face of stiff competition from China (competition that includes production from Taiwanese-owned assembly plants there). By 2000, exports of Chinese bicycles exceeded bicycle exports from Taiwan. Worse, low profits stifled innovation, as companies throughout the value chain battled to control costs. By 2003, bicycle exports from Taiwan were down to 3,880,000 units a year.

The recent rise in the dollar value of bicycle exports, however, offers a ray of hope. In particular, the average unit price of bicycle exports from Taiwan has increased from \$124 in 2002 to an average of \$199.9 in 2005, and bicycle export sales have increased from \$523 million in 2002 to \$918 million in 2005.

The A-Team gets credit for a rescue

Taiwan's A-Team, an association of Taiwanese bicycle assemblers and suppliers established in 2002 to revitalize Taiwan's prospects in the industry, has played an important role in that rebound. According to the latest statistics, A-Team members have seen a growth rate of 14 percent in the export of bicycles (June-August, 2005), average unit prices are now \$346, and sales volumes are up 36 percent – all evidence of the significant role Taiwan's A-team has had in improving the position of Taiwan's bicycle industry (Exhibits 1 and 2).

How has the success to date been accomplished? Taiwan's bicycle industry A-Team has had a mandate for improving industry performance in three main areas: production efficiency, product development, and market intelligence. While the market intelligence efforts of the A-Team remain in the early stages, Taiwan's A-Team seems to have been an important catalyst to change in areas of production efficiency and product development.

Exhibit 1 Export volumes and average unit prices for Taiwanese bicycles

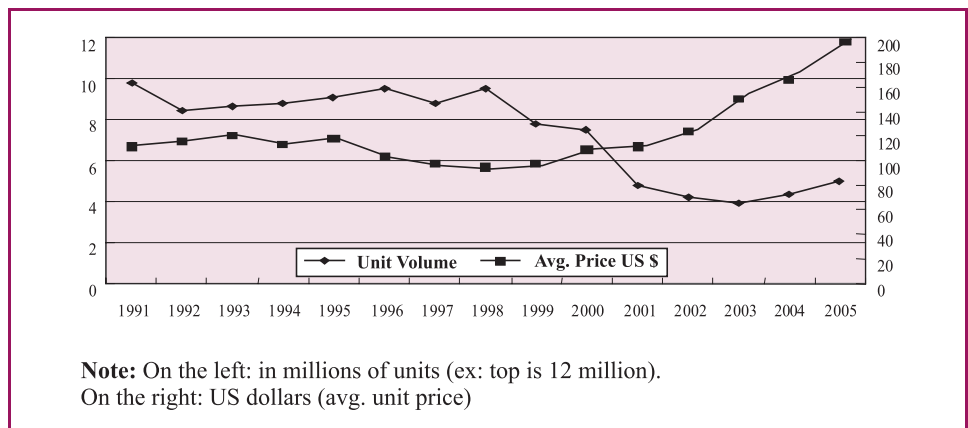


Exhibit 2 Unit volumes, export values, and average unit prices for Taiwanese bicycles, 1991-2005

Year	Unit volume	Category		
		Value of bicycle exports (US\$)	Average unit price (US\$)	Average unit price (NT)
1991	9,831,048	1,095,860,538	111.47	3,678.51
1992	8,427,073	972,903,468	115.45	3,809.85
1993	8,621,237	1,044,797,044	121.19	3,999.27
1994	8,751,660	988,424,740	112.94	3,727.02
1995	9,064,129	1,066,415,794	117.65	3,882.45
1996	9,503,365	982,056,520	103.34	3,410.22
1997	8,826,513	862,355,008	97.7	3,224.1
1998	9,546,303	907,799,515	95.07	3,137.31
1999	7,782,869	760,273,775	97.69	3,223.77
2000	7,534,350	821,360,285	109.02	3,597.66
2001	4,796,148	536,190,083	111.79	3,689.07
2002	4,219,038	523,835,383	124.16	4,097.28
2003	3,882,835	582,973,185	150.14	4,954.62
2004	4,348,037	720,745,592	165.76	5,470.08
2005	4,594,991	918,719,979	199.94	6,598.02

Source: Taiwan Bicycle Exporters' Association (<http://www.tbea.org/index.htm>)

Composition of the A-Team

Two companies, Giant and Merida, are the prime movers of Taiwan's A-Team. Currently, the A-Team also includes 19 suppliers – 11 original members and an additional eight suppliers that joined a year after the organization was founded.

The A-Team owes its establishment to a combination of the industry's recognition of the impending crisis and several powerful leaders. Antony Lo, President of Giant, and Michael Tseng, Merida's President were both aware of the competitive risks to Taiwan's bicycle industry. As a result, in 2002, the management teams of these two companies held secret talks – the direct consequence of which was the creation of Taiwan's A-Team.

In April, 2003, those efforts were made public at a press conference organized by Antony Lo, A-Team's president. He told the journalists that he hoped the establishment of the A-team might break the myth that it is not possible for competitors to cooperate in Taiwan. He also noted that the A-Team's mandate was to use existing, high quality labor and technology to focus on product differentiation to increase value added so that Taiwanese bicycle production might be seen as distinct from that in China and elsewhere. In total, three goals for the venture were put forward: (1) the implementation of lean production both within assembly plants and throughout the supply chain, (2) effective co-innovation with suppliers, and (3) co-marketing.

Lean production and the A-Team's on-site management initiatives

The A-Team's first efforts emphasized on-site management improvements and chose to focus on lessons Taiwan's bicycle industry might learn from a study of Toyota's production system (something Giant had been working on independently for a number of years preceding the founding of the A-Team). On-site improvements were considered according to each A-Team member's situation, and plans were set by Taiwan's Corporate Synergy Development Center in consultation with the A-Team. In particular, several steps were initiated, including: (1) the establishment of training workshops, (2) on-site visits to some of Kuozui Motors and Toyota's best suppliers, (3) monthly instruction from a TPS team dispatched by Kuozui Motors to A-Team suppliers, and (4) the training of some outstanding technicians.

Formally, A-Team members would meet once every three months and results would be presented once every six months. These meetings provided opportunities for members to exchange information, observe, and learn, and after each presentation, the Corporate Synergy Development Center, Giant, and Merida, would join with the A-Team's operations office to evaluate the work being done. Typically, they would suggest some operating changes and work to help lagging plants overcome their deficiencies.

As a result of such work, the average inventory at several member plants has decreased over 50 percent. Productivity seems to be increasing; space is being used more efficiently; and time-to-market is shrinking. In the case of the A-Team's two assembly plants, inventories and time-to-market both seem to have declined over 60 percent. Taken as a whole, A-Team efforts have driven the adoption of lean production techniques, and in so doing, have laid a foundation for the rapid, small batch production of more sophisticated, higher priced bicycles.

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Product development and co-innovation

The second phase of A-Team activity started in 2004 with efforts on the part of Giant and Merida to engage in collaborative product development with their suppliers. In particular, Giant focused its co-innovation efforts on the Revive EB, an electric bicycle, while Merida has focused on its Juliet line of women's bikes.

Giant: the Revive EB. The Revive EB, a semi-recumbent electric bike, received Taiwan's National Golden Image Award in 2004. The newest Revive EB model, sold in the US as the Revive Spirit, has an ergonomic design, an aluminum alloy body, a sophisticated Shimano suspension system, an electrical transmission system, and a unit price of over \$2,000. Using sophisticated technology and targeting relatively upscale consumers, the Revive EB may be viewed as a significant innovation, as it breaks with the traditional open, modular product structure for bicycles (Exhibit 3). It is also a good example of co-innovation in Taiwan's bicycle industry, as several Giant suppliers have been involved in all stages of the product development process including (1) concept development, (2) product planning, (3) product design, and (4) implementation.

In the design process, Giant has had intensive interaction with suppliers, during which innovation, technology, cost, quality, and function have all been evaluated together.

For the Revive EB project, Giant signed long-term agreements with its main suppliers to encourage them to help solve problems with orders, delivery, payment, and quality. The size of those orders, however, has not been guaranteed, and will depend on sales. Fundamentally, the overall approach is based on sharing risks and profits of the venture, if it is successful.

As Taiwan's leading bicycle manufacturer, Giant has devoted significant amounts of time and money to innovation. Looking ahead, however, its success will necessarily require the help of others. Through Taiwan's A-team, Giant has worked with Merida to lower risks and share in the prosperity of a healthy domestic bicycle industry. Giant also believes there is additional room for collaborating with its suppliers in product development as working relations among A-Team members becomes more natural.

Merida: Juliet. The Juliet bike is an example of Merida's efforts to cater to the women's market. To appeal to women, the pastel-colored bike is lightweight. While Merida has already worked with its suppliers to reduce the weight, the company's co-innovation efforts are just

Exhibit 3 The Revive EB



“For producers faced with the challenge of coping with the threat of low-cost competition, co-innovation within an integrated supplier network may be quite helpful.”

beginning. From a strategic perspective, however, the strength of Merida's approach seems to lie less in the nature of any specific enhancements and more in the company's ability to monitor market trends and quickly adapt its products to meet emerging consumer demands.

Co-marketing

While co-marketing efforts are still at an early stage, Taiwan's bicycle industry A-Team has worked with Taiwan's Industrial Technology Research Institute (ITRI) to develop a product-data-management (PDM) platform, which has been subsequently extended into an open PDM. Ultimately, such work may reach all the way to the final customer, linking Taiwan's A-Team to retailers around the globe and, in so doing, establish a global SBR (Special Bicycle Retailer) strategy. This would anchor Taiwan's position as the largest producer of high-performance bicycles in the world. It is still too early, however, to know how such aspirations will play out in practice.

The future of competition

In recent years, modularity has become increasingly important to discussions of product development, innovation, and management. While Taiwan's traditional networks have done an important job in supporting the competitiveness of Taiwanese industry by facilitating concurrent production, resource complementarity, and the ability to deliver products in a short period of time,[2] the cruel reality for manufacturing in Taiwan is that supplier networks in China have also begun to adopt many of the same characteristics.[3]

If Taiwanese manufacturing is to avoid decline, a new source of competitive advantage must be found. For this to happen, a new model of supplier relations may be needed to support the development of Taiwanese manufacturing going forward. Incorporating characteristics of an integrated, co-innovative supplier network, Taiwan's bicycle A-Team seems to represent an early example of just such a network.

Broadly speaking, integrated, co-innovative supplier networks have two basic features that differentiate them from traditional modular, symbiotic supplier networks. First, whereas traditional supplier systems have emphasized cost control, integrated, co-innovative supplier networks appear to be more focused on value creation through co-innovation. Secondly, by adopting a more integrated network structure, such supplier networks appear to have a greater ability to resist imitation.

Based on our studies of Taiwan's bicycle industry, there seem to be five basic conditions for establishing a successful integrated, co-innovative supplier network. In particular, there must be: (1) a strong awareness of industry risks and/or prospects, (2) trust among network members, (3) long-term interactive cooperative relationships, (4) a desire to learn, and (5) extensive communication, including substantial face-to-face communication.

For producers faced with the challenge of coping with the threat of low-cost competition, co-innovation within an integrated supplier network may be quite helpful. By working to coordinate the innovation efforts of assemblers and suppliers and also effectively implement relevant aspects of the Toyota production system for bicycle production, Taiwan's A-team has laid a good foundation. While some initiatives are still in the early stages, as a result of the A-Team's work to date, A-team membership has increased and the group has received considerable recognition both at home and abroad.

Research notes

This paper is part of a five-year research project related to Taiwan's bicycle industry. As part of the paper's fieldwork, interviews were conducted with the former president of Kuozui Automobile, Takehiko Harada, vice president Pai-rong Wang, manager Zhao-hua Li, Giant's president Antony Lo (President of the A-team), chief executive Qinq-xin Yan (who is also secretary for the A-team), company public relations spokesman Li-zhong Xu, technical center engineer Ming-en Zeng; Merida's president Michael Tseng (vice president of the A-team), vice president Qi-bin Yuan, director in charge of exporting and product, Bo-lin Li, and production manager Ru-ding Lai. Some of the A-team case information comes from a 2005 A-team presentation, and some other parts of the study were assembled through the efforts of Kai-jia Zheng and Li-ding Zhou, graduate students in industrial engineering and enterprise information at Tunghai University in Taiwan. Unless otherwise indicated, all financial statistics are reported in US dollars. A chart of all the supplier firms on the Taiwan bicycle industry's A-Team is available from the corresponding author, Jonathan Brookfield (jon.brookfield@tufts.edu).

Notes

1. Liu, R.J., Chang, W., Wei, T., Zheng, K., and Li, C. 2004, *From Manufacturing to Invention, from Symbiosis to Co-innovation: How ITIS Developed Itself from a Follower to an Innovator*, ITIS project press, (in Chinese).
2. Liu, R.J. 1999, *The Division of Labor Network: Analyzing the Competitiveness of Taiwan's Machine Tool Industry*, Linking Press, (in Chinese).
3. Brookfield, J. and Liu, R.J. 2005, "The internationalization of a production network and the replication dilemma: building supplier networks in Mainland China", *Asia Pacific Journal of Management*, (22): 355-380.

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